
JANUARY 1982
75p
COMPUTER & VIDEO GAMES
THE MAGAZINE THAT MAKES COMPUTERS FUN FUN FUN
THE ART OF SEDUCTION
COMPUTER STYLE
DRAGON DRUGGIN' TREASURE HUNT
A FEAST OF FANTASY INSIDE
THREE SINCLAIR 1K WONDER GAMES
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AND TAKE ON SNOOKER'S STEVE DAVIS



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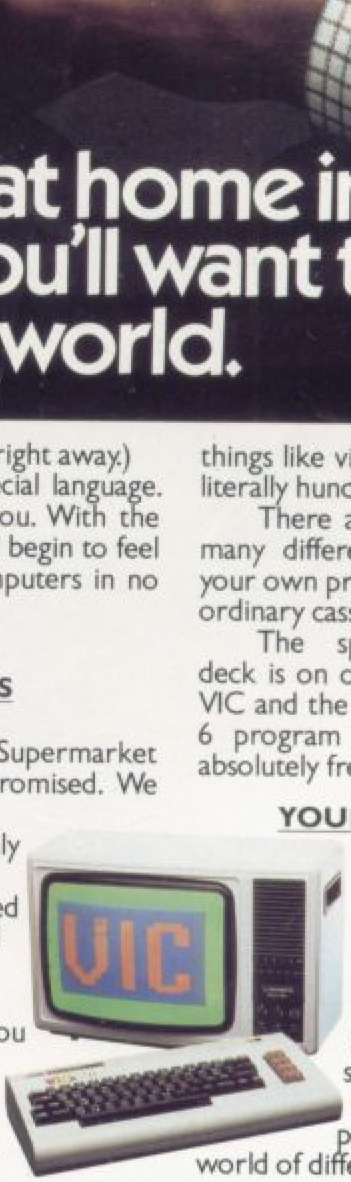
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COMPUTER & VIDEO GAMES

No. 3 JANUARY 1982

CONTENTS

NEXT MONTH

SCIENCE Fiction provides a fund of interesting and original ideas. Next month author David Langford begins an irregular column which will sift through the best of these and suggest new ideas for computer games writers.

OUR second look at Christmas 1982 and the toys and games which will capture our hearts 10 months from now — including one of the new generation "chip-board" games, Dark Tower.

TAKE on the African bush in Dr Livingstone, an adventure to find the famous Victorian explorer gets top billing next month. You can also key-in a Dogfight, Grand Prix and Nimbot, to name a few.

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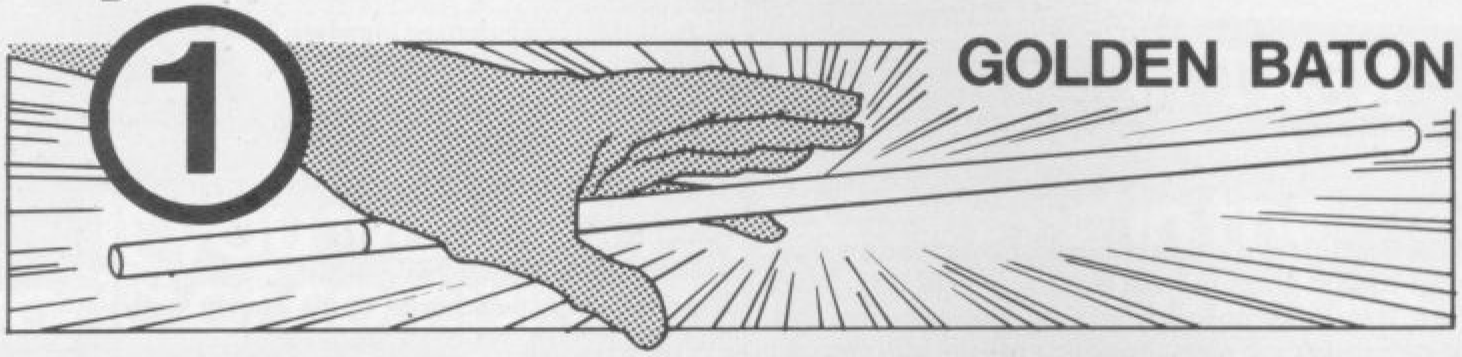
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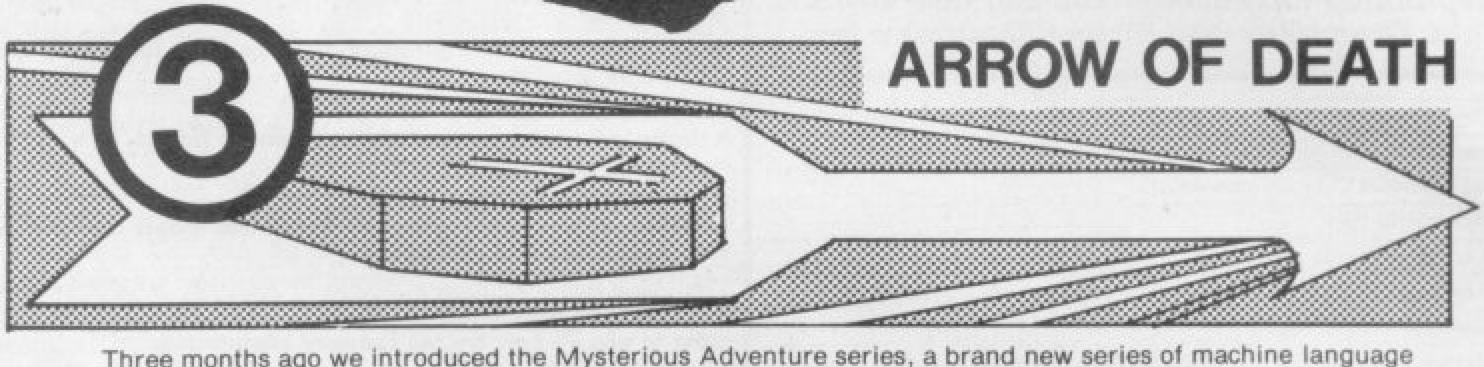
NEXT ISSUE ON SALE JANUARY 16th

INNOVATIVE
TRS 80-GENIE SOFTWARE
from the professionals

Mysterious Adventure







Three months ago we introduced the Mysterious Adventure series, a brand new series of machine language Adventures written by Brian Howarth. The first one, The Golden Baton, was greeted with enthusiasm by experienced and beginner Adventurers alike. Now the second and third in the series, The Time Machine and Arrow of Death, are available. The Arrow of Death, although entirely self-contained, is the first of a two part Adventure. The second part will be available early in the new year.

Mysterious Adventures are available for Models I and III TRS-80 and Models I and II Video Genie, both on tape (16K minimum) or disk (32K 1 disk minimum). A TRS-80 Model II version will be available shortly.

Any 1 Adventure:	On tape	£10.06	Any 2 Adventures:	On tape £18.40
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MAILBAG

MORE LETTERS on Page 7

GLOSSARY PUT TO GOOD USE

Dear Sir,
Being an Atari owner, I bought your magazine and was quite amazed at the possible applications computers can be put to.

I now day-dream of owning one of my own so have entered this tongue-in-cheek attempt, not knowing the slightest thing about Basic, but having digested the software glossary:

PUZZLE SOLUTION — RUNS ON 4 CUPS OF COFFEE + PACKET OF CIGARETTES
GOTO — quiet room when family have gone to bed
INPUT — 1st cup of coffee and cigarette
CURSOR — hundred times when random juggling fails to solve puzzle
INPUT — further cup of coffee + cigarette
RAM — head against wall for spilling coffee on puzzle
VARIABLE — success — only 3 sides matching
POKE — cat for mixing up cards thinking I wanted to play with him
OUTPUT — cat into garden
PEEK — at next-door-neighbour getting undressed with curtains open
RUN — indoors pretty quick when spotted by husband
DE-BUG — caused by much head scratching after further unsuccessful attempts
DISC — perhaps soothing music might help
LOOPY — if I don't solve it soon
INPUT — more coffee + cigarettes
LANGUAGE — getting pretty blue now
RESISTOR — temptation to give in
(H)ARRAY! — I've done it
INPUT — 4th cup of coffee + last cigarette

It's the honest TRUTH-VALUE as well. I'm not STRINGing you along, it's a GRAPHIC account of what happened. I'd thought I'd GO-SUBmit this to your EDITor by putting it in the post box FORTRANsit to you.

If you have a CAPACITOR for generosity you might PRINT this and send me some £££ — or even a microcomputer!

D. J. Sparke,
Ravensthorpe,
Peterborough.

THE INVADERS MYSTERY-SOLVED

Dear Sir,
First of all, I would just like to say what a superb first issue the *Computer & Video Games* was; as a beginner, I look forward to buying the magazine regularly.



Anyone who is addicted to "Space Invaders" will tell you that when the little green "meanies" get a little too low for comfort it can be quite a struggle to clear them off the screen when you only have one laser base left. Well, here is a tip which will amaze onlookers and make things a great deal easier.

If there are only 10 to 15 "invaders" left but are extremely low (not so low as to allow you to pass underneath without risk of losing a base) and your laser base is to the left of them and the "invaders" are going right, try firing at the *second* and *third* bases. Doing this will mean you get a "deflection" i.e. the "invaders" on the second row up will be shot thus killing some of them without you being near them. (Amazing eh?).

This trick is best appreciated being done and will help build up your score. Also, some people don't realise that you can become proficient in obtaining 300 points from the "mystery" space ship. First of all, fire 22 lasers, wait, and shoot the mystery saucer with the 23rd shot. From then on, shoot the mystery ship with the 15th shot. Doing it this way will enable you to obtain a high score quickly. (I frequently score 3390 points on the first sheet!)

Another tip, don't shoot the invaders in the middle first but get the ends first, that way the invaders won't come down so quickly.

Ian Clark,
Dalton,
Huddersfield,
Yorkshire.

Editor's reply: Thanks for the tips Ian, some, I'm sure, many space invaders' players know already, others may prove a real eye-opener. Now a question for you, do you know how to get a Rainbow on Space Invaders Part II?

DISCIPLINE SNAG JNR.

Dear Sir,
Firstly let me congratulate you on an original and interesting magazine. But there is an error in line 200 of Keith Campbell's Adventure column (December issue).

Please discipline Snag Jnr. before you write any more programs as he may well become another Screaming Foul-up.

Simon Balfre,
Kingston-upon-Thames.

Keith Campbell replies: A typographical error did creep into the second column in line 200. It should have read:

```
200 IF MID$ (E$(LN),I,1) = R$ THEN LN = VAL (MID$(D$(LN),I,1)):GOTO 160
```

Another point on last month's column. I used READ and DATA to set up arrays — sorry Sinclair owners! You will have to directly assign the array e.g. LET L$(0) = "COTTAGE".

PET SOFTWARE

DIATRON ATTACK

The Diatrons are a mean bunch of aliens. They have no use for what they are stealing from you (your diamonds), but nevertheless, their guiding principle is to 'steal first' and ask questions later.

This offends your moral standards so much that you have no hesitation in using your terrible spikes.

See them beam down and squawk. Sharpen up your reflexes and beat back the waves of descending Diatrons.

16K (New Rom)
£8.95

Sub Commander

This is not an Arcade type game but it is a real time graphics simulation of the commander of a World War II sub. Your mission as commander is to seek out and destroy enemy shipping, both warship and merchantmen.

The merchantmen are not always sitting ducks as Q ships are also encountered but radar, periscopes, hydrophone etc. with a good visual display enable you to hunt effectively.

Don't forget to contact your supply ship as running out of fuel or ammunition is rather embarrassing to a commander in line for the IRON CROSS.

GOOD HUNTING

32K and 16K versions (New Rom)
Please specify **£13.95**

CONQUEROR

A tyrant is sweeping through Europe unopposed.

GORVAN THE TERRIBLE is well named. You have been put in command of the armies which control the few remaining countries of the alliance.

Mere survival will be difficult but your task is to eradicate GORVAN from the face of Europe.

The prize? — fame and glory
To fail? — Gorvan is indeed terrible

A game of tactics and strategy played with excellent graphical representation of Europe.

16K (New Rom)
£12.95

ASTEROIDS

Fast action Pet version of popular arcade type game 'Asteroids'. All the facilities, Rotate, Fire, Hyperspace, Jump.

(Old and New Rom)
on one cassette
8k **£9.95**

TRS-80, APPLE SOFTWARE

Are you fed up with games where you just shoot a few invaders or depend on your reactions, then try a whole new world of computer fantasy, a world in which Sorcery and Monsters holds sway, try:

SORCERER OF SIVA

A real-time GRAPHIC adventure

Sorcerer of Siva is a game where you enter a different world where Amulets, rings, necklaces, sceptres — and — oh, yes, a pair of old boots await you — in the magical mines of Siva.

Enter the dark stillness of the mine, armed with just a dagger and relying on your magical abilities. But beware of the wandering soulless creatures that dwell in the magical mine, guarding every treasure and trap door.

Use your magical powers to slay the bloodthirsty banshee, put an end to the deadly demon, or the goblin waiting to waylay you.

Walk through walls and sealed entrances, cast a spell to heal your wounds, regain your strength or hurl bolts of lightning.

A wizard you are, yes, but watch out for the evil Sorcerer who is waiting to cast his favourite spell — forgetfulness — to deprive you of your most valuable magic.

But all is not lost — you may regain a spell or two, or perhaps even one new to you — if you can discover the wondrous touchstones, stone saturated with powers to restore your magical abilities. Be warned too, that not all treasures you might find are true. In experience lies wisdom.

£15.95 TRS-80 & V.G. (level II, 16k) cassette
£17.95 TRS-80 (32k TRSDOS), Apple (48k with Applesoft in ROM)

****

The Upper Reaches of Apshai . . .

. . . is the first in a series of expansion modules for "The Temple". Horrible monsters lurk in the innkeeper's backyard. Discover the secrets of Benedic's Monastery and the cottage of Merlis the Mage. Who knows what secrets the cellar of Olias holds.

Over 150 new rooms for you to explore.

The Keys of Acheron

For those of you who have succeeded in rescuing Brynhild as the Hellfire Warrior, now have an even **more** difficult task; Four magical jewels, the keys, each in a different dimension, must be recovered from Kronus the Demon.

Both The Upper Reaches of Apshai and The Keys of Acheron are expansion modules for the Temple and Hellfire, you **must** have these games to play them.

£11.95 TRS-80 & V.G. (level II, 16k) cassette
Temple of Apshai £16.95
Hellfire Warrior £16.95

SPECIAL OFFER: If you don't have Temple or Hellfire, then purchase both Temple and The Upper Reaches of Apshai or Hellfire Warrior and the Keys of Acheron for just £24.95 Cass. £26.95 disk.

All prices include p & p and V.A.T.

ALGRAY

ALGRAY House, 33 Bradbury Street, Barnsley, South Yorkshire.
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MAILBAG

TO FIT 2K OR NOT TO FIT 2K

Dear Sir,
Recently, I read about the Sinclair ZX81 kit, and I found out that it was possible to fit a 4816 2K × 8 RAM in 28-pin pack in the RAM location instead of the normal 1K. What I would like to know is where to get this 2K RAM from and how much it would cost?

I have also heard a rumour that it is possible to fit a 5K RAM instead at a cost of £19.95. Is it true? If so could you give me more details and what effect would it have in conjunction with the 16K RAM pack, i.e. what final K would it have?

V. Napolitano,
Slough,
Berks.

Our expert replies: You are correct in assuming that the ZX81 can take a 2K RAM in place of the two 2114s or the one 4118 used now as the 1K memory. The 4816, 2K by 8 RAM is available through Pronto Electronics Systems, 446-478 Cranbrook Road, Gants Hill, Ilford, Essex. The chip is made by Mostek, MK 4816. The one-off price is about £30, which is excessive!

As to your other enquiry, there are several versions of expandable memory which will slot onto the back connector of the ZX81 in place of the Sinclair 16K RAM pack. These vary from 3K up to 64K at a cost of £9 to £110 respectively. This makes the 16K RAM pack look rather expensive.

The maximum amount of usable memory would seem to be 64K although it appears that there is a 128K expansion board available using a paging system.

A PACK OF PROBLEMS

Dear Sir,
Having purchased the ZX81 and 16K RAM Pack, I have experienced the following:

1) The P.S.U. as supplied with the kit was intermittent. This was due to a broken leg on the transformer LT winding.
2) The basic (no pun) unit crashed after a couple of hours' use.
   Due I believe, to excessive heating of the Voltage Regulator — it appeared that heat was affecting the 8K ROM?
   Having fitted a larger area of heat sink this problem seems to be eliminated.
3) During periods of programming the machine, with the 16K RAM attached, the whole "caboodle" crashes. To this, at the moment, I have found no simple answer.

So, the area of my concern at this time is to find an answer to the 16K problem.

It is not easy for me to return the pack to Sinclair as I have delved into the workings. To help cure picture jitter of graphics I have fitted 0.1 Fd capacitors to the remaining memory chips. This modification has "cured" that problem. However, in the course of trying to solve problem three, I have broken the wire ribbon connecting the two boards together. I've replaced this with a different ribbon altogether and so, probably, invalidated the warranty.

So, perhaps your resident expert, or other readers could provide an answer to what appears to be a nationwide dilemma.

R. L. J. Winson,
Mortimer,
Reading,
Berks.

Our expert replies: I have come across the problems you have suffered many times and, with some success, have managed to sort them out.

The problem of the system crashing has been one which has plagued many and the only explanation I have been able to find is that through entering a long program the external RAM pack becomes a little loose. This leads to spurious signals reaching the ZX81 which causes the system to crash. One way of fixing the fault, literally, is to attack the pack with super-glue. This however, is rather drastic unless you intend never to move the unit. The more temporary measure is to support the pack with a thin book or whatever while you are programming.

If, however, this does not cure the problem do not hesitate to return the pack to Sinclair, who in the past have repaired items which do not look like ZX81s at all.

If you have a comment or idea for Computer & Video Games we would like to hear from you.
Please drop us a line at: Computer & Video Games, EMAP, Durrant House, 8, Herbal Hill, London EC1R 5JB.

CRASHING ALIENS

Dear Sir,
I am an avid 14-year-old computer addict. In my school we have a Research Machine 380Z which I use frequently.

In the last issue of *Computer & Video Games* you published an Invaders program for the Nascom 2. After making the necessary language changes from Nasbasic, I ran the program but unfortunately it crashed.

So please would you kindly either print an invaders program for the 380Z or let me know where to obtain one.

Ronald Lewis
Aldrington Road
Streatham
London SW10

Editor's reply: You can find a source from which to obtain an invaders program by scanning the adverts from suppliers of software for the RM 380Z, Ronald. I'm not so sure that this is the best use to which a school micro can be put: I hope that you wouldn't prevent anyone from using the machine for school work, or even to develop their own programs, by playing space invaders!

The problem of translating a program from one dialect of Basic to another, is such a common one that a book has been written to help people to do it. *The Basic handbook* by David A Lien (Compusoft Publishing, 1978) lists the corresponding features of many Basic dialects, including several of those implemented on micros.

TAKE ON THE ARCADE WORLD

The search is on to find the roughest, toughest, fastest, deadliest, alien assassin around.

If you are blasting more space-invaders, galaxians or asteroids than anyone in your pub or arcade, this is your last chance to tell the world about your talent.

Whatever your favourite machine, send us in your best score and you could be on your way to the finals of the Best Arcade Player in the World Competition.

In conjunction with Taito Electronics we are trying to find the best galaxian-blaster, puckman muncher, asteroid annihilator or invader halter going — and give him the acclaim he is due.

The competition is very easy to enter, simply fill in the machine you wish to enter on and take the form down to your local pub or arcade. Put the best score you can on the machine, ask the pub or arcade owner to sign it and send it off to us.

Should you find yourself producing a disappointing score simply try again.

The highest scores on the 10 most popular machines will appear in our Arcade Action section to give the rest of the arcade world something to aim And the three top scorers on the three most popular machines we hear from by 7 January will be invited to take part in our Grand Arcade Game Final.

CHAMP MUST PASS THE STEVE DAVIS TEST

Current world snooker champion, Steve Davis, has two loves. His first love is naturally enough the game of snooker which has brought him fame, riches and allowed him to indulge his second love — space invaders.

Steve is a keen player of arcade games and is often pictured relaxing between games in a snooker championship, by having a quick 20p's worth on whichever game the organisers of the event have been good enough to install close-by.

But on 26 January, Steve has been good enough to take time off from a snooker tournament to take part in our Best Arcade Player in the World Competition.

Steve will be along to watch the finalists in action — and maybe pick up a few tips on the featured games — and also take on the winner at the mystery final game which will be one not so far seen in the arcades of Britain.

Our guess is that Steve will have his work cut out but look forward to seeing him in action on the 26th.



The finals will be taking place on Tuesday 26 January. Tickets will also be sent to the best runners-up to come along and enjoy the evening.

EMAP will pay all the expenses of the nine finalists to and from the event and, in the case of the younger finalists, the expenses of a parent as well.

Taito Electronics have agreed to supply the three machines which prove most popular, for our finalists to do their early battles on and they will produce a fourth mystery machine for the three winners of each section to contest the Grand Final on.

This will be a game new to the U.K. market. And it is on this machine that our Best Arcade Player in the World will immediately have to justify his or her title by taking on snooker champion and space invader enthusiast, Steve Davis.

Steve has quite a reputation as an arcade-gamester so it promises to be quite a tense tussle.

If you haven't already entered, make sure you don't miss out on your opportunity to take on the best in the arcade world and fill in the card and return it to us.

Are you a top arcade player

I would like to enter the Best Arcade Player in the World Competition.

The machine I play on is: ....

My highest score is: .... **which I scored on (date):** ....

The manager of the arcade/pub where I achieved this score was a witness.

Signature of witness ....

Name and address of arcade/pub ....

....

My name is: ....

Address: ....

....

Tel: .... **Signed:** ....

Now please post this form to: Computer & Video Games Limited, Durrant House, 8 Herbal Hill, London EC1R 5JB

DELUGE US WITH GAMES

Only with your help can we continue to make *Computer & Video Games* a worthwhile purchase.

Our existence as a magazine depends on you, the readers, deluging us with games program listings which you have invented for your own microcomputer.

We are willing to pay £10 for each games listing published. Please check your programs carefully before you send them into us. I know the temptation is to look at our creations through gold-tinted spectacles, but, just before you run it off on the printer, check to see that if the biggest moron going tried to play the game (I may well do so when it gets to the office) he could do so without crashing it.

Another please now: Please do not send us programs that you have copied from professional tapes or spotted in other publications, these may be spotted by our eagle eyes or they may slip through and cause untold problems.

If possible could you include a cassette of the game so that we, or one of our review team, can try it out and give a rundown on just how good it is.

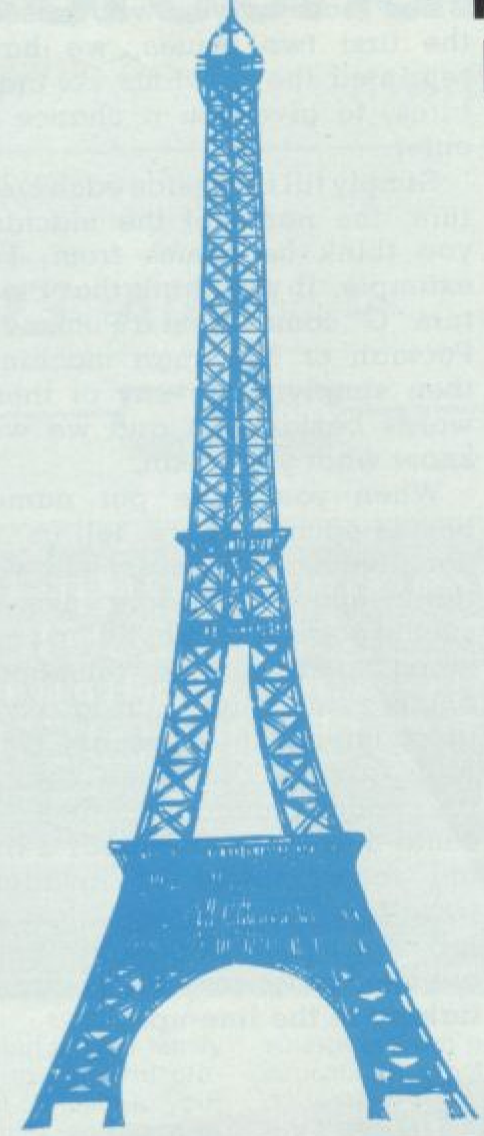
Each month we will be picking out a couple of programs and giving a briefing on how they were put together. What the variables are doing and how the programmer has overcome certain problems with an idea that other readers could adopt to their machines.

So if you could also enclose with your listing, a brief rundown of how to play the game; whether it can be played by one, two or more people.

A brief synopsis of what the game is about will also be of benefit, and a list of what the variables or certain subroutines are doing.

So whether you have written a massive adventure in 48K for your Apple, or a 1K bat and ball program for the Sinclair ZX81, we are waiting to hear from you.

I'm sure there must be plenty of easier ways to earn a tenner but are there any as rewarding?



PARIS AWAITS OUR BEST PROGRAMMER

You could be in a position to treat a friend to a weekend in Paris — complete with spending money — next year.

That is the prize for the best games program listing sent into us in the first 12 months of this magazine's life.

Paris may not be the games capital of the world but it does have its attractions and, when you are spending our money, I'm sure it will be all too easy to turn what could have been "just another weekend", into the weekend of a lifetime.

Come next October a panel of judges will sit down to play all the best games which have been sent into us. They will take into account the originality of the game, the use of the facilities that particular computer has to offer, playability, programming prowess and presentation.

Just about anyone — apart from myself, can enter — and win the weekend in Paris. There is also the prestige of being heralded as a top games writer. Who knows where that could lead?

BRAINWARE ANSWERS

The train was 22 minutes early in our second Mind Routines problem and the commuter and his faithful wife lived 11 miles from the station. British Rail have since informed us that it was actually the previous train 38 minutes late.

The solution to Nevera's December crossword is printed right. We will publish the names of the winners next issue.

The month's Brainware problems are on page 67.

A	S	T	E	R	O	I	D	B	E	L	T	S
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F	L	O	A	T	I	N	G	P	O	I	N	T

COMPUTER & VIDEO GAMES' free competitions are open to anyone except EMAP employees and their relatives.

Entries to our Mind Routines, Nevera Crossword, Know your Creatures, Game of the Year and Arcade Player of the World competitions, should be sent to COMPUTER & VIDEO GAMES, Durrant House, 8 Herbal Hill, London EC1R 5JB. Judges' decisions are final and no correspondence can be entered into.

Send entries to Mind Routines on a postcard and in all cases please include a name, address and, where possible, a telephone number.

TAKE TAITO'S INVADERS PRISONER

It is usually kill or be killed with the relentless Space Invaders, but we are now offering you a chance to take some prisoner.

An infinite number of these deadly aliens have been signed up to do duty on the Taito Electronics Space Invader machine which will go to the winner of our Know your Creatures competition.

The aliens will, of course, be safely locked away in a cocktail table, ready to do battle at a moments' notice.

Six creatures have already appeared in the last two issues of *Computer & Video Games* for you to put a name to. If you can also tell which machine these last three arcade inhabitants come from, you will be in the running for your own Space Invaders table.

For those of you who missed the first two issues, we have reprinted the previous six creatures, to give you a chance to enter.

Simply fill in, beside each creature, the name of the machine you think he comes from. For example, if you think that creature "G" comes from a Puckman, Pacman or Mazeman machine, then simply write any of those words beside him and we will know what you mean.

When you have put names beside each creature, tell us, in not more than 25 words, why you think space invaders proved such a popular game. Fill in your name, address and telephone number and send it off to reach us no later than 15 January 1982. And Taito — the name behind the space invaders craze — could make your dream of a living room supply of invaders come true.

Be warned, though, that there are one or two sneaky creatures lurking in the line-up.

ENTER THE GREAT TEMPLATE COMPETITION.
SUPER PRIZES TO BE WON!
SEE THE COMPETITION PAGE IN THIS ISSUE FOR DETAILS.



THAT TEMPLATE!

If you've mislaid the free template we gave away with our December issue, you'd best start looking for it now.

Because that flexible strip of plastic has untold uses far beyond the one we innocently designed it for.

We thought it might be useful for keying-in the games listings we print in the magazine but offered prizes for the best other uses you could think of putting it to.

And after applying a good deal of imagination and some inspired lateral thinking you have proved that a good template is worth its weight in gold (about 10p).

We have selected a few bizarre examples at random for printing so you can begin to draw up a mental picture of your fellow *Computer & Video Games'* readers. (Mental is probably the operative word.)

Our template can be used to:

- Break up the gungy bits which inevitably form at the bottom of a damp mug when you make instant cup soup.
- Repair squeezy bottles after the kids have been watching *Blue Peter.*
- Scraping mud from your legs after a game of football.
- Beetle flicker!
- Stop homing pigeons flying off by glueing their feet to it.
- Wear it on your nose in Alaska as an amorous eskimo repellent.
- For measuring how far your pet snail has travelled in the past six hours.

We will sift through the entries to pick out 10 winners for publication in the February issue. It promises to make entertaining reading.

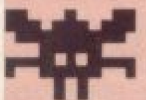
KNOW YOUR CREATURES/3

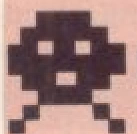

A ______

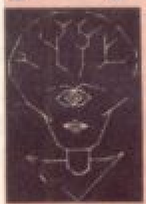

B ______


C ______


D ______


E ______


F ______


G ______


H ______


I ______

I think Space Invaders proved so popular because: ______

Name ______
Address ______

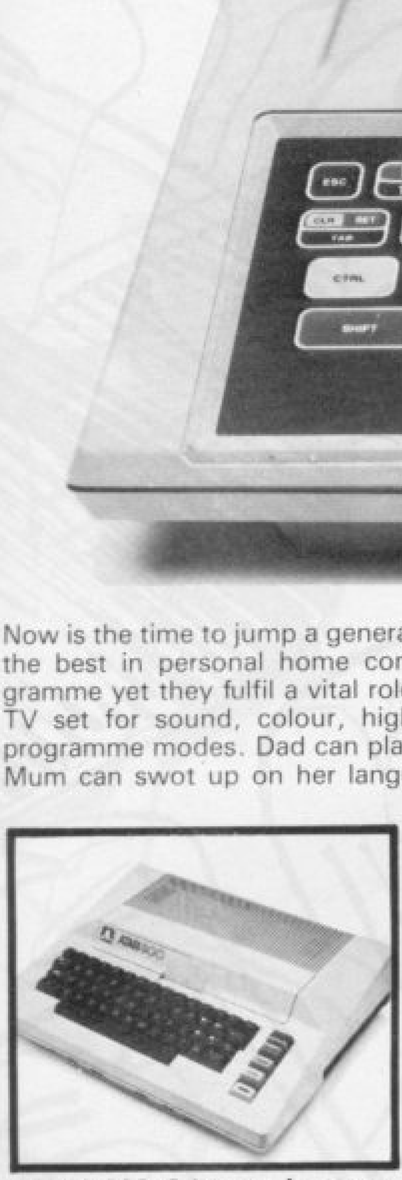
Telephone: ______

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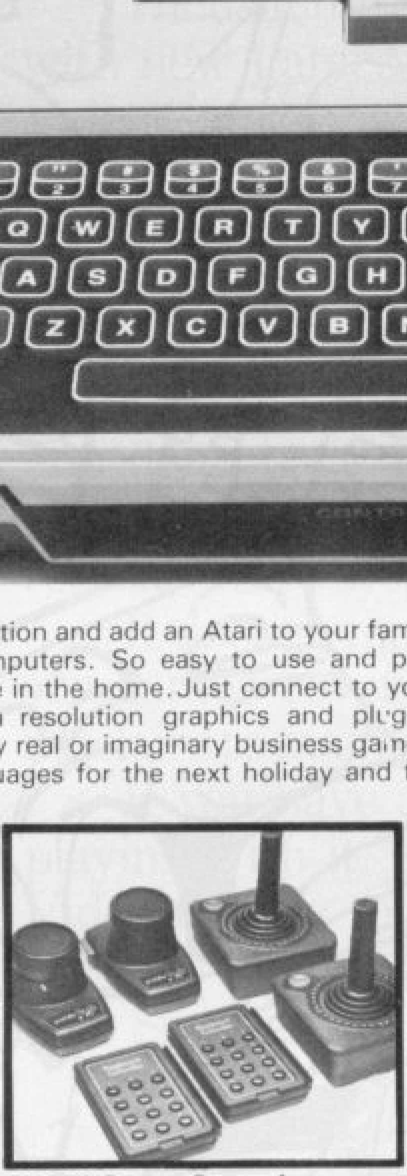


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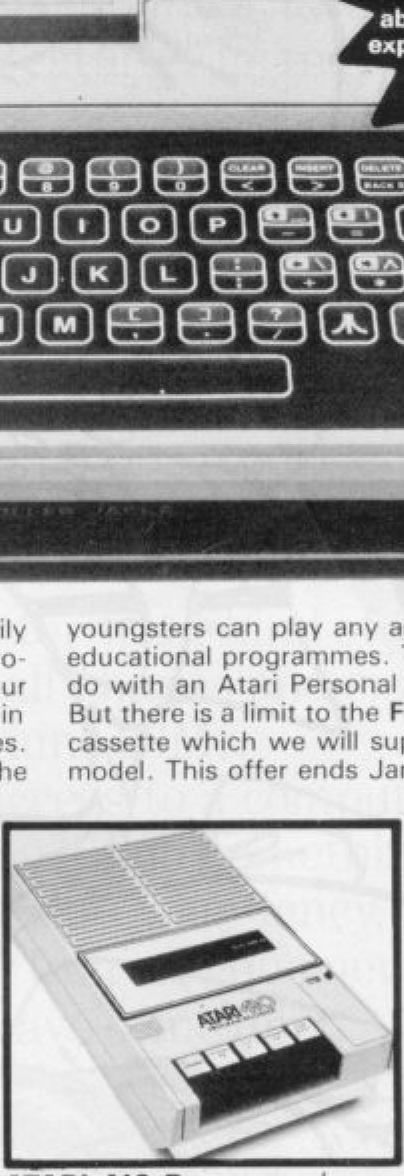
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THE FOUR OCTAGONS PUZZLE

OUR SOLUTION

The programmed solutions to our first issue Four Octagons puzzle have been flooding in.

Some 300 had been received by the time this page had to be put to press. (And it was one of the first to go!) We have all been very surprised — and impressed — by the standard of entry and the amount of work many of you have gone to.

The first program arrived on our desk within two days of the first issue appearing in the newsagents and subsequent solutions have come in with some marvellous pieces of presentation. From the hand written, to those that arrived complete with listing, tape and photographs of the display, all packaged in a neat file, they will all be tried and tested by our judges.

In the meantime here is a chance to see how puzzle setter James Dalgety of Pentangle, went about producing a program to solve the puzzle. It runs on a Pet but the program has been written, as far as is possible, using general Basic language.

IT IS often far easier to solve a "mechanical" puzzle than it is to either prove that the solution is unique or specify all the solutions.

However at Pentangle, where we specialise in manufacturing difficult puzzles, it is frequently necessary that we do both.

The first job is to analyse the puzzle: there are four octagons each of which can contribute one of two faces to any solution. Each face consists of eight pairs of symbols. I decided to split these into two groups of four pairs of symbols, so I could easily adapt the program for use on squares in the future.

The octagons have to be placed on a two by two grid, but as the puzzle is only to match the edges there is no need to consider rotations of the overall solution thus one card can always be placed on one of the four locations and the remaining three cards permutated on the three remaining locations.

For every permutation of card locations each card must be (a) rotated and (b) turned over to test each of its 16 edges for a match against its two neighbouring cards. The total of 393,216 tests makes it necessary that the program is as fast as possible, but publication of the program makes it desirable to have graphics or a pretty picture.

I wrote the program for a 3032 Pet, but being frequently frustrated by coming across programs in magazines full of PEEKs and POKEs for machines other than Pets, I assume other readers get equally annoyed. So I ruled that I must not use PEEKs or POKEs in my program. This slowed it down and involved some rather untidy programmed cursor movements but hopefully made it more portable.

Lines 360-390 hold the data. Each symbol has been converted to a number from 1 to 7. (I started with card No. 1 numbering it clockwise and end up with four sets of alternate edges taken from the front and back of each card.)

Lines 110-130 define the vari-

ables in the order of the frequency with which they will be used. This is done to save machine time searching the variables.

Subroutine 710-850 is the explanatory preamble followed by an option in line 860-870 for users with a printer. (P$ and F are solely related to the print option which gives hardcopy of only solutions, not pretty pictures.)

Subroutine 880-1130 provides the pretty picture. To save time it seemed sensible to overprint this with the current status as required rather than print it all each time.

This, in fact, led to the necessity of subsequently using programmed cursor movements for the overprinting, but these were still quicker than printing the whole picture and also made it possible to get hardcopy of the essential data only on the Pet printer.

On the screen option the program waits before displaying a solution before continuing, whereas on the printer option, it continues automatically. To save time the current test is only shown on the screen when "G" is pressed.

Line 150 directs to the subroutines 400-450 and counts the positions 1-6.

Subroutines 400-450 read the data into arrays A$, B$, C$, and D$ each containing the four sets of mutually exclusive symbols used in any one test. The six subroutines represent the six possible locations of the cards. Because numbers are being used for the symbols the cards have been renamed A, B, C, D, instead of 1, 2, 3, 4, to avoid confusion. The position is recorded in AR$.

Line 160 starts the loops which in line 170 select each of the four sets of edges that are to be used.

Line 180 starts the loops which rotate each of the sets of edges four times.

Line 190 skips out to display the current test if requested.

Lines 200-270 test for a match of edges and if a no match is found skip further matches and go to line 290 count the tests in N and rotate the cards in lines 300 and 310 and so on.

If all edges do match line 280 directs to the solution display and print subroutines.

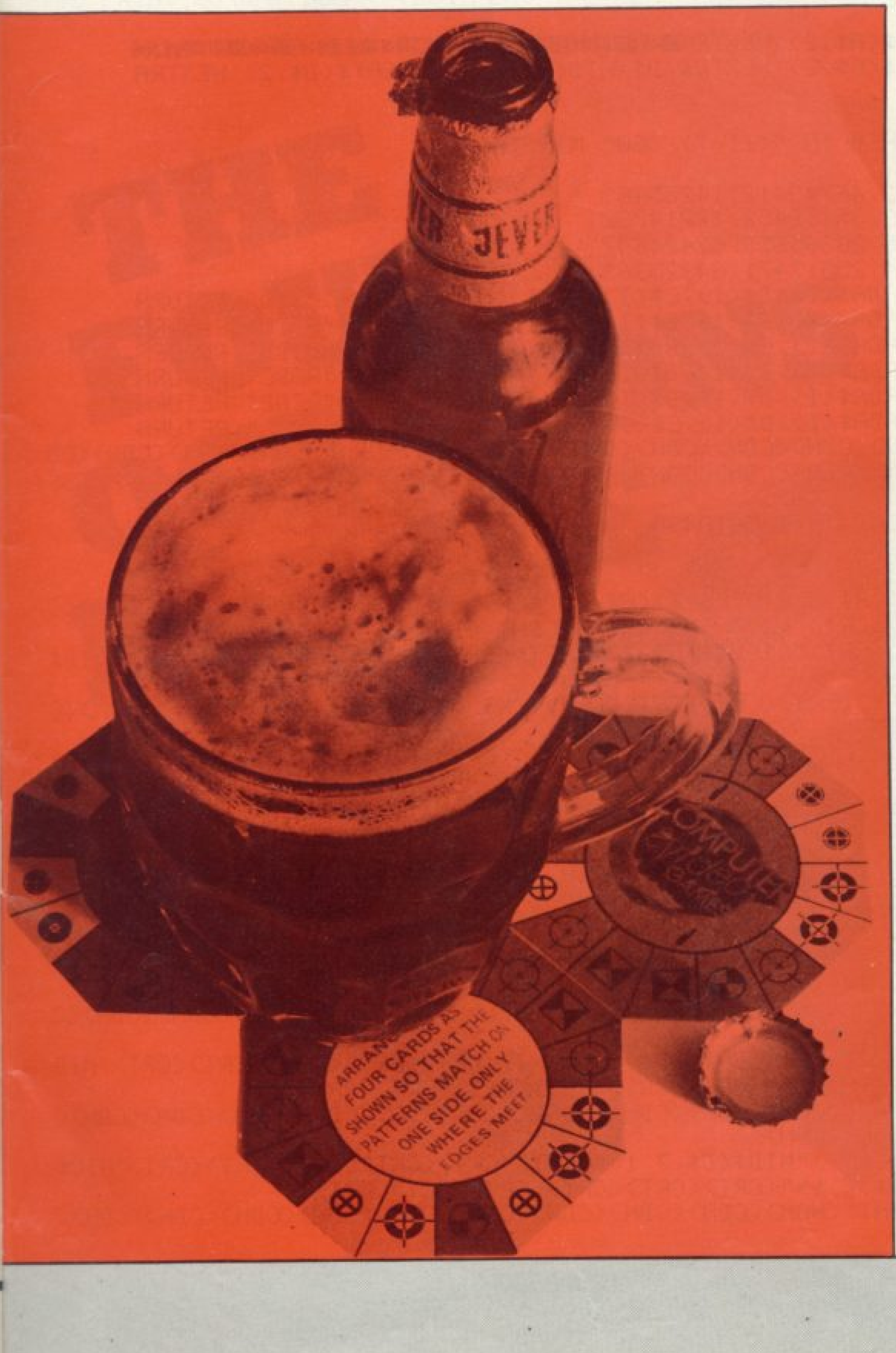
Lines 460-480 either prints the solution or waits 'til asked to display it, using the same subroutine as the current test display.

Lines 490-700 are used to overprint the current test or solution onto the pretty picture. Edge symbols are shown in the octogons. The inner letters show the location of each card. The outer numbers show which set of edges is being tested (0 and 1 being on the front and 2 and 3 the reverse). The number of solutions and tests so far are shown together with the average time per test (this increases dramatically the more you look!).

On being confronted with the task of writing a program to solve the Four Octagons puzzle; my first thought had been "How easy!", my second was "How difficult" and by the time I had finished I was convinced that I had set about the whole project in the most difficult possible way.

I have subsequently had a brilliant idea but as I won't be allowed to win the prize I will keep it secret unless of course I am adequately bribed!

I look forward with great interest to seeing how other readers tackle the puzzle on different machines.



```
100 REM THEPUZZLE6  23SEPT1980
110 A$="X":B$="X":C$="X":D$="X":N=1:RD=0:RC=0:RB=0:RA=0:N4=0:N3=0:N2=0:N1=0
120 DIMA$(3),B$(3),C$(3),D$(3)
130 I=0:SF=0:AR$="X":F=0:T=TI:S=0:FW$="<CRT><CRT><CRT><CRT><CRT><CRT><CRT><CRT>
<CRT><CRT><CRT><CRT><CRT><CRT><CRT><CRT><CRT><CRT><CRT><CRT><CRT><CRT><CRT><CRT>
<CRT><CRT><CRT><CRT><CRT><CRT><CRT>"
140 GOSUB710
150 SF=SF+1:ONSFGOSUB410,400,420,430,440,450,340:REM** SIX CARD LOCATIONS
160 FORN1=0TO3:FORN2=0TO3:FORN3=0TO3:FORN4=0TO3:REM*** 256 DATA PERMUTATIONS
170 A$=A$(N1):B$=B$(N2):C$=C$(N3):D$=D$(N4)
180 FORRA=0TO3:FORRB=0TO3:FORRC=0TO3:FORRD=0TO3:REM*** 256 ROTATIONS OF DATA
190 GETX$:IFX$="G"THEN GOSUB490
200 IFMID$(A$,3,1)<>MID$(B$,8,1)THEN290
210 IFMID$(A$,4,1)<>MID$(B$,7,1)THEN290
220 IFMID$(B$,5,1)<>MID$(C$,2,1)THEN290
230 IFMID$(B$,6,1)<>MID$(C$,1,1)THEN290
240 IFMID$(C$,7,1)<>MID$(D$,4,1)THEN290
250 IFMID$(C$,8,1)<>MID$(D$,3,1)THEN290
260 IFMID$(D$,1,1)<>MID$(A$,6,1)THEN290
270 IFMID$(D$,2,1)<>MID$(A$,5,1)THEN290
280 GOSUB460
290 N=N+1
300 A$=MID$(A$,3,6)+LEFT$(A$,2):NEXTRD:B$=MID$(B$,3,6)+LEFT$(B$,2):NEXTRC
310 C$=MID$(C$,3,6)+LEFT$(C$,2):NEXTRB:D$=MID$(D$,3,6)+LEFT$(D$,2):NEXTRA
320 NEXTN4,N3,N2,N1
330 GOTO150
340 GOSUB470:PRINT"FINISHED IN "(TI-T)/360" MINUTES"
350 END
360 DATA12315164,54435262,46743412,14255463
370 DATA23456545,35414213,35152452,17214732
380 DATA41172624,23153665,26365653,62424647
390 DATA56317164,21134314,25517471,34325363
400 RESTORE:FORI=0TO3:READA$(I),B$(I),C$(I),D$(I):NEXTI:AR$="ABCD":RETURN
410 RESTORE:FORI=0TO3:READA$(I),B$(I),D$(I),C$(I):NEXTI:AR$="ABDC":RETURN
420 RESTORE:FORI=0TO3:READA$(I),C$(I),B$(I),D$(I):NEXTI:AR$="ACBD":RETURN
430 RESTORE:FORI=0TO3:READA$(I),C$(I),D$(I),B$(I):NEXTI:AR$="ADBC":RETURN
440 RESTORE:FORI=0TO3:READA$(I),D$(I),B$(I),C$(I):NEXTI:AR$="ACDB":RETURN
450 RESTORE:FORI=0TO3:READA$(I),D$(I),C$(I),B$(I):NEXTI:AR$="ADCB":RETURN
460 S=S+1:PRINT"<HOM><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CD
N><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CRT><CRT><RVS>  SOLUTION!! PRESS
'C' TO CONT<OFF>"
470 IFP$="P"THENOPEN4,4:CMD4:F=1:GOTO490
480 GETX$:IFX$<>"C"THEN480
490 PRINT"<HOM><CDN><CDN>";
500 PRINT"<CRT><CRT>"N1"<CRT><CRT>"LEFT$(A$,2)"<CRT><CRT><CRT><CRT><CRT><CRT><C
RT><CRT>"LEFT$(B$,2)"<CRT><CRT>"N2:PRINT"<HOM><CDN><CDN><CDN><CDN><CDN>";
510 PRINT"<CRT><CRT><CRT><CRT>"RIGHT$(A$,1)"<CRT><CRT><CRT><CRT><CRT><CRT>"MID$
(A$,3,1)"<CRT><CRT>";
520 PRINTRIGHT$(B$,1)"<CRT><CRT><CRT><CRT><CRT><CRT>"MID$(B$,3,1):PRINT"<HOM><C
DN><CDN><CDN><CDN><CDN><CDN>";
530 PRINT"<CRT><CRT><CRT><CRT>"MID$(A$,7,1)"<CRT><CRT><CRT><CRT><CRT><CRT>"MID$
(A$,4,1)"<CRT><CRT>";
540 PRINTMID$(B$,7,1)"<CRT><CRT><CRT><CRT><CRT><CRT>"MID$(B$,4,1):PRINT"<HOM><C
DN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN>";
550 PRINT"<CRT><CRT><CRT><CRT><CRT><CRT><CRT>"MID$(A$,6,1)MID$(A$,5,1)"<CRT><CR
T>"LEFT$(AR$,1)"<CRT><CRT>"MID$(AR$,2,1);
560 PRINT"<CRT><CRT>"MID$(B$,6,1)MID$(B$,5,1):PRINT"<HOM><CDN><CDN><CDN><CDN><C
DN><CDN><CDN><CDN><CDN><CDN><CDN><CDN>";
570 PRINT"<CRT><CRT><CRT><CRT><CRT><CRT><CRT>"+LEFT$(D$,2)"<CRT><CRT>"RIGHT$(AR
$,1)"<CRT><CRT>"MID$(AR$,3,1)"<CRT><CRT>";
580 PRINTLEFT$(C$,2):PRINT"<HOM><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><C
DN><CDN><CDN><CDN><CDN><CDN>";
590 PRINT"<CRT><CRT><CRT><CRT>"+RIGHT$(D$,1)"<CRT><CRT><CRT><CRT><CRT><CRT>"MID
$(D$,3,1)"<CRT><CRT>"RIGHT$(C$,1)"<CRT><CRT><CRT><CRT><CRT><CRT>";
600 PRINTMID$(C$,3,1):PRINT"<HOM><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><
CDN><CDN><CDN><CDN><CDN><CDN><CDN>";
610 PRINT"<CRT><CRT><CRT><CRT>"MID$(D$,7,1)"<CRT><CRT><CRT><CRT><CRT><CRT>"MID$
(D$,4,1)"<CRT><CRT>"MID$(C$,7,1)"<CRT><CRT><CRT><CRT><CRT><CRT>";
620 PRINTMID$(C$,4,1):PRINT"<HOM><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><
```

```
CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN>";
 630 PRINT"<CRT><CRT>"N4"<CRT><CRT>"MID$(D$,6,1)MID$(D$,5,1)"<CRT><CRT><CRT><CRT
><CRT><CRT><CRT><CRT>";
 640 PRINTMID$(C$,6,1)MID$(C$,5,1)"<CRT><CRT>"N3
 650 PRINT"<HOM><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN
><CDN><CDN>"FW$N
 660 PRINT"<HOM><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN
><CDN><CDN><CDN>"FW$;INT((TI-T)/60/N*1000)/1000
 670 PRINT"<HOM><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN
><CDN><CDN><CDN><CDN><CDN>"FW$;S;
 690 IFP$="P"ANDF=1THENPRINT#4:CLOSE4
 700 F=0:PRINT"<HOM><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN>
<CDN><CDN><CDN><CDN><CDN><CDN><CDN><CDN><CRT><CRT>
    ":RETURN
710 PRINT"<CLR><CDN>      <RVS>** COMPUTER AND VIDEO GAMES **<OFF>"
730 PRINT"<CDN>OBJECT:- TO ARRANGE THE FOUR OCTOGONS  "
740 PRINT"SO PATTERNS MATCH WHERE EDGES MEET?"
750 PRINT"<CDN><RVS>CAN YOU WRITE A SHORT AND SIMPLE PROGRAM";
760 PRINT" <RVS>  TO FIND EVERY SOLUTION QUICKLY ?      "
770 PRINT"I TAKE A WHILE TO TEST 393216 POSITIONS.";
780 PRINT"SO WHY DON'T YOU SPEND THE NEXT FEW
```

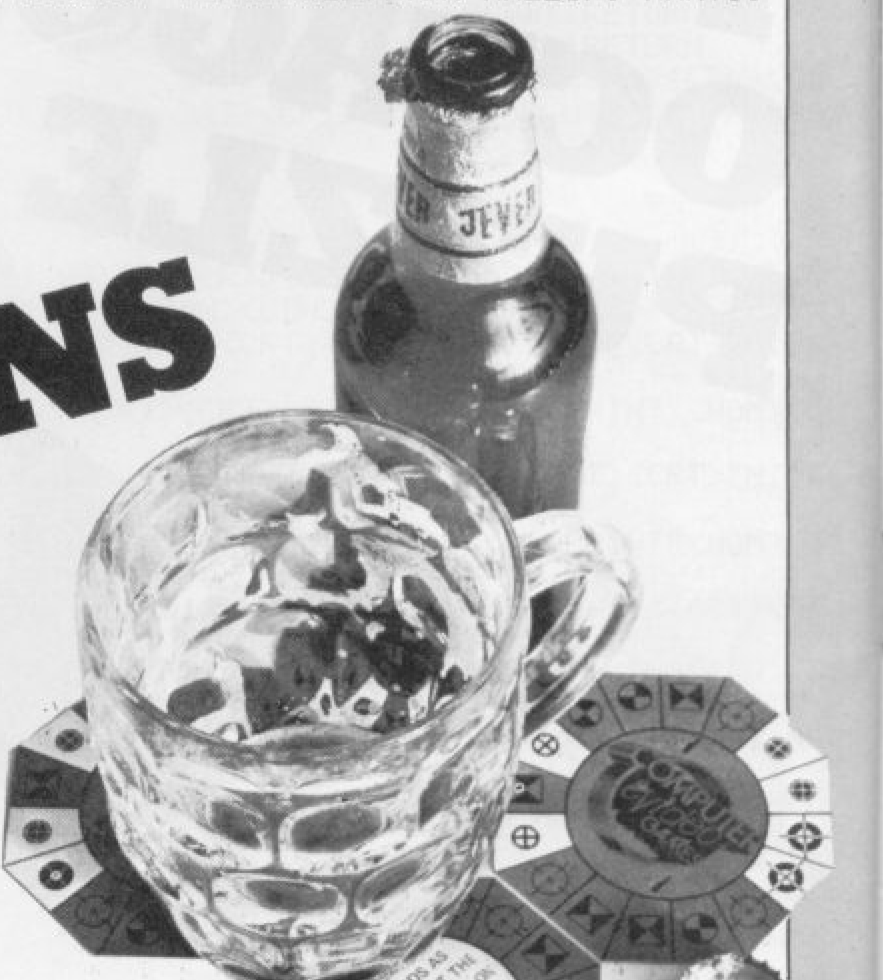
THE FOUR OCTAGONS PUZZLE



```
790 PRINT"HOURS PROGRAMMING WHILE I BLOW MY CHIPS"
800 PRINT"SOLVING IT THE LONG WAY ?":PRINT
810 PRINT"<RVS>   YOU CAN SLOW ME DOWN EVEN MORE BY     "
820 PRINT"<RVS>  PRESSING 'G' FOR THE CURRENT STATUS.   ":PRINT
830 PRINT"   A.B.C.D. INDICATE THE CARD POSITION  "
840 PRINT"<RVS>THE OUTSIDE 0 TO 3 INDICATE THE EDGE SET"
850 PRINT"I START WHEN YOU DECIDE IF YOU WANT"
860 INPUT"SOLUTIONS TO SCREEN OR PRINTER <RVS>S/P<OFF>   S<CLF><CLF><CLF>";P$
870 IFP$<>"S"ANDP$<>"P"THEN860
880 T=TI:PRINT"<CLR>";
890 PRINT"<RVS>     *** COMPUTER AND VIDEO GAMES ***     ";
900 PRINT" <OFF>"P$"    ____      ____                <RVS> ";
910 PRINT" <OFF>      /    \    /    \                <RVS> ";
920 PRINT" <OFF>     /      \  /      \   A PUZZLE    <RVS> ";
930 PRINT" <OFF>    |        ||        |              <RVS> ";
940 PRINT" <OFF>    |        ||        |    FROM      <RVS> ";
950 PRINT" <OFF>    |        ||        |              <RVS> ";
960 PRINT" <OFF>    |        ||        |  PENTANGLE   <RVS> ";
970 PRINT" <OFF>     \      /  \      /               <RVS> ";
980 PRINT" <OFF>      \    /    \    /                <RVS> ";
990 PRINT" <OFF>       ____      ____                 <RVS> ";
1000 PRINT" <OFF>      ____      ____    THE           <RVS> ";
1010 PRINT" <OFF>     /    \    /    \     PUZZLE      <RVS> ";
1020 PRINT" <OFF>    /      \  /      \        PEOPLE  <RVS> ";
1030 PRINT" <OFF>   |        ||        |               <RVS> ";
1040 PRINT" <OFF>   |        ||        | <RVS>TEST NO<OFF> 0      <RVS> ";
1050 PRINT" <OFF>   |        ||        | <RVS>AV TIME<OFF> 0      <RVS> ";
1060 PRINT" <OFF>   |        ||        |               <RVS> ";
1070 PRINT" <OFF>    \      /  \      / <RVS>SOLUTION<OFF> 0    <RVS> ";
1080 PRINT" <OFF>     \    /    \    /                 <RVS> ";
1090 PRINT" <OFF>      ____      ____                  <RVS> ";
1100 PRINT" <OFF>                                      <RVS> ";
1110 PRINT" <OFF>                                      <RVS> ";
1120 PRINT"<RVS>     ** PRESS 'G' FOR CURRENT TEST **     <OFF>";
1130 RETURN
1140 REM PLEASE LET US SEE ANY BETTER PROGRAMS: PENTANGLE.OVER WALLOP. HANTS.

READY.
```

THE FOUR OCTAGONS PUZZLE



GAMES NEWS

CLEAN-UP AT THE RACES

HONEST JOE

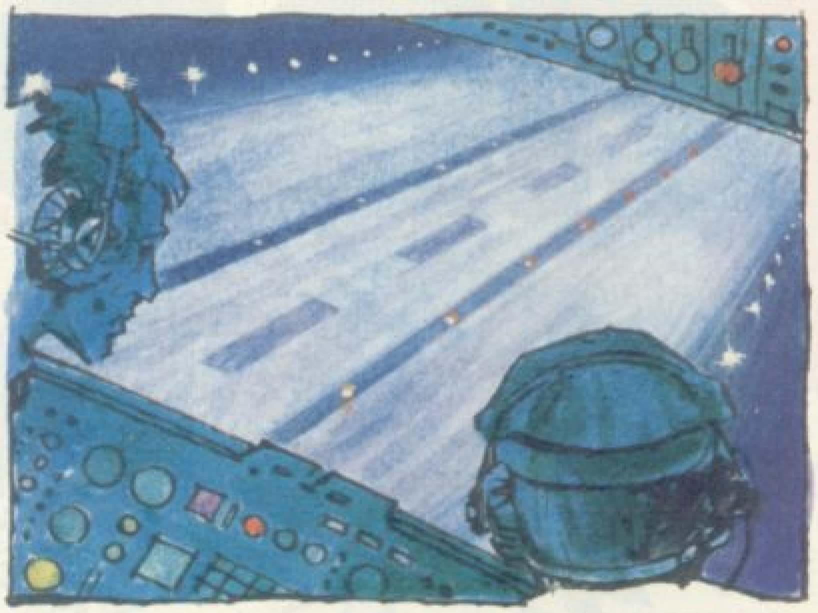
A bookie's life is a hectic one and he needs to be shrewd and calculating — all eyes, ears and hands to make the most out of his business.

You can try it for yourself in a new game called Honest Joe.

Rake in the punters' cash from badly placed bets in a mock-up race — aim: to make a profit. Horses' form for previous races is given by the computer and randomly selected in each race. You must judge what bets to take.

A recent addition to the Molimerx range of games software for the Tandy TRS-80 16K; you can buy it either in cassette or disc form, £8.75 and £11.75 respectively.





WILL SIMULATORS TAKE OFF?

JUMBO JET LANDER

You can experience the exhilaration of piloting an aeroplane while keeping both feet on the ground in Jumbo Jet Lander.

Learning to take-off, fly and land, without leaving your living room is now possible with the latest piece of innovative software for the Atari personal computer.

Using marvellous graphics, this game is for the Atari 800 and simulates the cockpit of a jumbo jet.

Complete with hazards, both on-board and in the sky, it could almost turn into a recreation of the recent comedy film **Airplane.**

The screen displays a view from the pilot's seat and you can either select a daylight flight and landing or try the more difficult night-flight.

It requires a controlled mind as you take-in the information from the many dials displayed before you. These register the condition of the aircraft throughout the flight, to allow pilot to monitor his air pressure, flight path, height and speed.

It takes some getting used to and it will be some time before you become experienced enough to land with any confidence.

In charge of the controls, it's your job to rectify anything that goes wrong in the flight period.

This game clocks in at just under the £30 mark and many purchasers may be put off. But the realism and graphics do offer a marvellous standard which other machines and software manufacturers find hard to achieve.

It is produced by Thorn-EMI's software arm and follows other games: Darts, Snooker and Submarine Commander.

SUPER GLUE GALAXIANS

MARTIANS

What do you get when you cross galaxians with super glue? The answer can be found in Program Power's Martians game.

A metal-clinging species of creature lurking in the depths of outer space is the evil force at work to destroy your galactic cruiser.

If the aliens build up on the outside of your own ship with six clinging on to it they overcome the controls of the cruiser. You lose the game and they take command.

The game is said to be inspired by the space adventure series **Blake's Seven**. A forcefield surrounding your spaceship is at your disposal for defence purposes. When the field is down, the aliens can make a bee line for your craft. Beware though, your forcefield is not always strong enough to protect the ship.

Some of the sticky creatures are imposters in the swarm which can be deceiving. Just when you think you have stopped the aliens, an imposter will descend disguised amongst the rest of the mob. These suddenly transform into creatures which can penetrate your forcefield regardless of its strength.

The game's points system works on the number of aliens you prevent breaking through the forcefield.

Martians is written for the Acorn Atom and a copy in cassette form costs £7.95.

MOONRAIDER

Man the controls of a spacecruiser on a bombing mission flying across an undulating horizon, to blast targets marked out on the landscape below.

You really need three pairs of eyes: to watch out for targets on the ground, the hazardous horizon dotted with enormous mountains which come into view without warning, and the numerous alien craft which attack your ship.

There are four levels of skill for you to try your hand at plus sound effects which are emitted from the keyboard port. Moonraider runs on the Nascom and is a version of the arcade game Scramble.

It is produced by Program Power of Leeds and costs £8.95.

DANGER! BIRDS OF PREY . . .

FALCON

It's no wonder birds of prey are becoming endangered species, when they are shot down as fast as they are in Falcon.

This version of the arcade game Phoenix is another space invasion game, putting the player up against impossible alien odds.

Fighting off the Falcons in this new Apple game is a hard task which has three separate stages to test your tactical ability and marksmanship.

The first and second phases of the invasion involve the same version of these malicious bird-like creatures. In the third phase a new and more deadly variety takes over the attack.

And should you survive this onslaught, a mothership appears, to drop hundreds of Falcons on you.

Falcon costs £16.95 from S.B.D. Software but the different levels of difficulty will keep up a player's interest.



GAMES NEWS



A HOBBIT'S MISSION

The classic Tolkien tale **Lord of the Rings** comes to life on your television screen in a new adventure game.

The Cracks of Doom, is based on the story of the adventures of Frodo described in the classic fantasy book and runs on a 32K Pet. There are five objects for you to find by interrogating the computer, using command words to tackle obstacles put in your way.

When you find all the objects though, your task is not over. You then have to locate the Cracks of Doom and drop each item, in turn, into the crevasse's depths.

CRACKS OF DOOM

Only once the objects have hit the bottom, do the Gods reward you.

Hazards encountered on your perilous journey include canyons which you must take care not to tumble into, and evil creatures blocking your path which you have to deal with as well as a poor hobbit can. If you pick the right thing to do, the game goes on . . . if not you're dead!

Recently brought out by Supersoft, the Cracks of Doom was written by the same author of the successful adventure game Hitchhiker's Guide to the Galaxy which has frustrated Pet owners the length and breadth of the country.

Anticipating a large demand for the game, Supersoft have brought it out on both tape and disc with a price tag of £16 attached.

SEASONAL SING-SONG

CAROLS

Tune into Christmas with a Carol cassette to add to the seasonal festivities.

The Carols tape runs on the Sharp MZ-80K so you can load and listen to up to 20 different popular carols. For £5.50 all your old favourites are on the cassette including: Good King Wenceslas, While Shepherds Watched Their Flocks By Night, Once in Royal David's City, Ding Dong Merrily on High and O Little Town of Bethlehem.

It's on sale now from Sharp software specialists Newbear. Other additions to its Sharp range are Quadrax, an imitation of the traditional game, Four-in-a-Row. This version is in 3-D and the object is to get four of the same coloured counters slotted in one row. You play against either the computer or human opponents. For those who can think in 3-D. It costs £5.50.

A space invader spin-off is out as well. Called, Cosmiad from Newbear, it follows the traditional game but is more difficult because the invaders are more erratic than other versions' invading forces. It too runs on the MZ-80K and costs £8.

LIFTING A MAGICAL CURSE

DRAGON'S EYE

A new mysterious and complex adventure game of necromancy looks certain to keep Pet owners company in the long nights.

So complicated are the rules and sections of the game that a 31 page booklet comes with the pack. The brief history behind the theme of Dragon's Eye is surrounded by the mysteries of a magical art, necromancy.

A curse was put on a land known as the Seven Provinces by the Evil Necromancer, who held the power to control time. Only the player, by entering and taking part in this fantasy, can wipe out the spell woven by the Evil Necromancer.

At the end of the game, no matter how far you have got with it, you will be awarded points. If you get the honour of receiving less than 100 you know you are terrible. To achieve the wreaths of distinction deserved only by a grand master you need to earn yourself the grand total of 4000 to 5999 points. No mean feat. Supplier for this and an Apple version is Algray Software; it costs £16.95.



CHILDREN'S NURSERY FANTASY

This month marks a departure from traditional adventure games filled with demons, dragons, wizards and warlocks.

Specially written for children the new adventure game, Dreamworld, sets nursery rhymes as the scene of action.

Using well-known nursery rhymes, children too can get to grips with adventure before mov-



ing on to the more advanced and complicated versions on sale. And all in the relatively peaceful

DREAMWORLD

surroundings of children's fantasy world using simple command words to tell the computer what to do.

The Tandy TRS-80 is the machine this adventure game runs on with 16K of memory. It is available from TRS-80 suppliers Molimerx of Bexhill-on-Sea for £8.75 on tape and £11.95 on disc.

For adult and experienced adventure players the firm has expanded its Mysterious Adventure series Time Machine and Arrow of Death of which a second part is to follow later. The latter is a continuation of the first Molimerx adventure, the Golden Baton in which the object is to recover a stolen baton and restore it to its rightful place. In the Arrow of Death (1) the baton has grown tarnished and has been overcome by an evil power whose source is unknown. Your task is to find and banish the source.

Both cost £8.75 for the tape version and £11.75 for the disc.



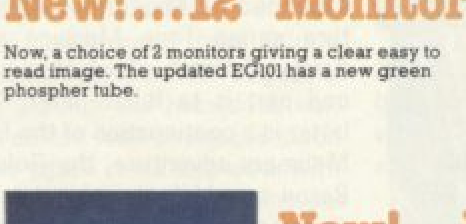
ingenious!

...that's the only word to really describe the superb Genie microcomputer system, the home computer which is compatible with the TRS 80, and ideal for all micro – enthusiasts, especially the committed hobbyist.
Genie has now been upgraded to Genie I, incorporating all of the original, excellent features, but with the addition of:

- Extended BASIC, including RENUMBER and SCREEN PRINT.
- Full upper and lower case, flashing cursor and auto-repeat on all keys.
- An internal SOUND UNIT to add a new dimension to your own programs.
- A MACHINE LANGUAGE MONITOR, with Display, modify, enter and execute (with break points) facilities.

Genie I has all of this, plus the built-in cassette deck, 16K RAM, 12k ROM with BASIC interpreter, full-size keyboard , an extremely wide range of new and updated peripherals, and literally 1000's of pre-recorded programmes available.
Yet, almost unbelievably, the price of Genie I is even lower than that of the original Genie.

Ingenious for business



The Genie II is a major breakthrough for small business computers. Harnessing all the advantages of Genie I, including low price, Genie II adapts perfectly to commercial functions with the following features:

- Numeric keyboard
- Four usable, definable function keys.
- Extension to BASIC
- Basic business commands
- Fully expandable with the same peripherals

New!...12″ Monitor



Now, a choice of 2 monitors giving a clear easy to read image. The updated EG101 has a new green phospher tube.



New!...Expander

An updated Expansion Box (EG 3014) is a major feature of the new Genie I system, and unleashes all its possibilities, allowing for up to 4 disk drives with optional double density. It connects to a printer, or RS232 interface or S100 cards. There is 16k RAM fitted and it has a new low price!

New!...Printer

The EG 602 printer can be connected to the Genie either through the expander or directly into the computer using the Parallel Printer Interface. It is a compact unit, with an 80 column, 5 x 7 matrix print-out, operating quietly and efficiently at 30 characters per second.





Disk Drive

As well as the obvious advantage of mass storage, the addition of the disk system to the Genie means much faster access to other languages and full random access file handling. Up to 4 of these 40 track drives can be used on a system.

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for all your technical advice and service back-up on any aspect of the Genie system direct from the experts!

For full details and demonstration of Genie I, Genie II or advice on any aspect of the system, either call in to your local dealer, or write directly to the sole importers at the address below.

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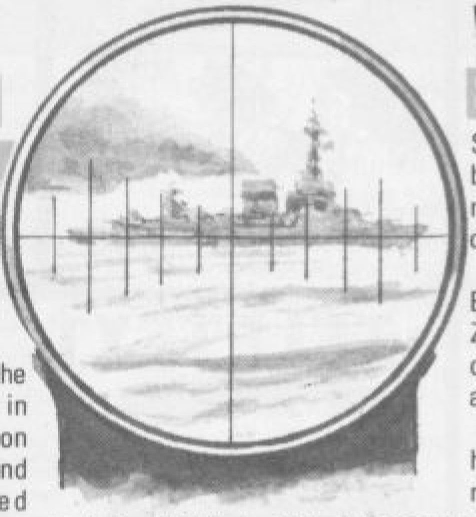
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GAMESNEWS

MISSION OF DESTRUCTION

SUB COMMANDER



Guide a crew of World War II submarine men through a dangerous mission into safety as the commander of the vessel.

In a war game simulation, the submarine commander is in charge of carrying out a mission seeking out enemy ships and destroying them. Frenzied attacks on merchant convoys have to be carried out too, but even these are not easy targets as they are often surrounded by an armed escort of naval vessels.

In the submarine itself are all the vital dials and pressure gauges found in a World War II submarine. There's a radar to track down the enemy's position so you can prepare your attack and a periscope to survey the scene above the waves after an attack.

Sub Commander runs on both 32K and 16K Pets and is available now from Barnsley based software firm Algray Software for £13.95.

FLIGHT INTO DANGER

PEGASUS II

Pilot a plane through the night sky armed with laser beams and a hold full of bombs.

The object of Pegasus II is to defend your aircraft from an enemy force attacking you with four types of alien creatures and craft. At the same time you have to navigate your way along a hazardous route which contains objects and dangerous missile bases to blast at your vessel.

You set the landscape by heightening mountains to fly over. There is a refuelling manoeuvre when your gas runs low, taking the plane through metal sensory satellites until you reach the redocking stage.

Pegasus II runs on the Apple with 48K of memory. It was written in the U.S. and has recently been brought over to this country by S.B.D. Software and costs £17.95.

WANTED: A UNIVERSE SAVIOUR

SUPER INVASION

Space Invaders on the ZX81 can be just as challenging as on other machines with more sophisticated graphics.

This recent addition to the Essential Software Company's ZX81 games range emulates the classic Space Invaders format and runs in 8K.

The player's task is to defend his own ship from scores of rapidly descending galactic creatures whose sole aim in life is to destroy you and take control of the Universe.

The shoot button is the 0 or 1 key on the board and the directional control keys are the numbers 5 and 8. Altogether you get five laser base lives, so each time one of your lasers is destroyed it reduces your total power.

If your laser base is wiped out quickly, the picture on the screen freezes for a second and then the game flicks back to the beginning for an automatic restart.

If you lack a space invader game in your ZX81 games library, now's the chance to rectify it. Copies are available from The Essential Software Company for £6.00 each.

BREAK THE COLOUR CODE

MASTERMIND

Pit your wits against the computer in a test of mental agility to crack the computer-set code.

The old favourite Mastermind has got another run for its money, this time on Commodore's latest machine, the VIC-20. You either have the knack of playing this logical guessing game or not but if you do, you'll find it converts well to the VIC.

You select between five and nine guesses at breaking the colour coded problem set by the computer. The code is made up of four variables and there are two columns on the right-hand side of the screen giving the clues to the accuracy of each guess.

The letter "B" represents a black peg and tells you that you have got a guess with the right colour in the right place. "W" represents a white peg and means that you have got a guess in the right column but the wrong position.

Points are scored at the end of the game depending on how many guesses it took.

There is a reverse of this game out too, called Codemaker. In that one you set the code for the computer to break. And in some cases, man is better than machine. Both games are from Adda Computers VIC Centre in North Acton and cost £14.95 each.



SENSING VICTORY

MINI CHESS

As electronic chess grows in popularity new games are being brought out at lower prices to give more enthusiasts a chance to tackle computerised opponents.

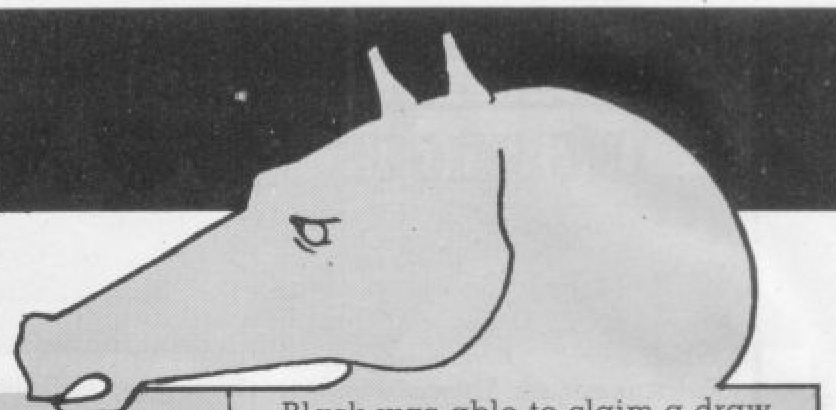
An addition to the Challenger range of games is Mini Sensory Chess Challenger. It's only 21 × 11.5 × 5 cm in size, so it can easily find a resting place in the home or office.

The sensory surface of the board means a keyboard is not needed. When the pieces are pushed onto the board the game's memory takes over. It recognises each chess piece when it's moved and stores away information of where each piece is placed.

The capabilities of the mini game are soon to be expanded with the introduction of plug-in modules. Scheduled for release are an advanced chess program, popular book openings and famous chess games which players can try out for themselves.

The game is fairly hardy coming in a tough plastic casing and costs £54.95 from Computer Games distributors. It either runs off batteries (not supplied) or can be run off a mains transformer.

CHESS



By Max Bramer

In last month's article I gave examples of two appalling blunders made by the program named Albatross in last year's first world microcomputer championship. This month I am returning to the topic of errors: major and minor, straightforward and subtle.

At first glance, it might seem surprising that a computer — a supremely logical device — could ever make errors in a non-chance game such as chess. However, this is far from true.

LOOKING at computer errors reinforces a sense of human superiority. In the chess field it is also of value to those developing their own programs.

It is certainly not unknown for a program to lose by attempting to make an illegal move, such as a Pawn's initial "double" move when the intervening square is not empty!

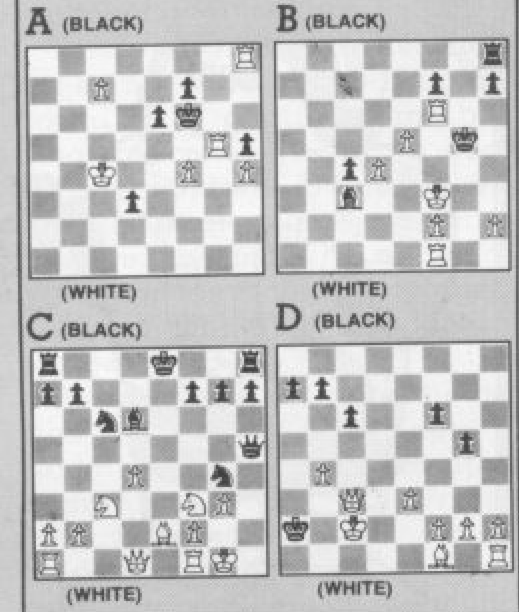
A particularly bad case of an illegal move occurred in the first European Computer Chess Championship which was played in Amsterdam in August 1976. In the second round, Orwell reached position (A) against Tell.

Orwell (White), to move, next advanced the Queen's Bishop Pawn to the eighth rank and obviously has a trivial win. Unfortunately Orwell neglected to make any pronouncement about the promotion, i.e. whether the Pawn should be changed to a Queen or some other piece. Strictly, the arbiter David Levy (an international chess master) should now have forfeited White on the grounds that it could not play a legal game. Orwell went on to win.

The sequel does, in fact, support Levy's ruling. It is clear that Orwell did not regard the offending Pawns as promoted to Queens and, perhaps more surprisingly, Tell obviously did not either!

Since 1970, the Association for Computing Machinery (ACM) has sponsored an annual United States (later North American) championship. In the first of the series, played in New York in 1970, the following game was played between Tony Marsland's program (White) and J. Biit (a program written by U.S. master Hans Berliner — the name stood for Just Because It Is There).

1. P-QB4, N-KB3; 2. P-Q4, P-K3; 3. Q-Q3? (developing the Queen much too early), N-B3; 4. N-KB3; P-Q4; 5. N-K5? (unnecessarily moving the same piece twice at an early stage, and losing a



Pawn), PXP; 6. QXP (B4), B-N5ch (6.... QXP wins a Pawn at once); 7. B-Q2, BXBch; 8. KXB? (the worst move, losing a piece for no reason), NXN; 9. Q-B5? (again, the worst move, losing the Queen), N-K5ch; 10. Resigns! After 10.... NXQ all White's developed pieces would have been captured. The explanation of this weird game is probably a programming bug which caused the program to prefer positions where it was as far behind in material as possible!

Position (B) was reached a year later at the second U.S. championship in Chicago. C.C.C.P. (White) has completely outplayed David (Black) and has a simple win, but it had not been taught to avoid repetition.

1.R-N1ch, K-R4; 2. R-B5ch, K-R3; 3. R-B6ch, K-R4; 4. R-B5ch, K-R3; 5. R-B6ch, K-R4; 6. R-B5ch and Black was able to claim a draw.

More difficult to avoid is (C) Kaissa v. Chaos, first computer championship, Stockholm, 1974.

Here Black should probably castle queen-side, with good chances. However, the program gave high value to positions where the King was surrounded by its own men "for safety". In this case, this objective led Black to fatally weaken his position by 1.... K-Q2? a misapplication of a perfectly reasonable rule after which Black may well be lost.

The last example (D) is a famous one, which could only have been played by computer. For seven moves, White has a mate in one, but is in no hurry to play it. A mate in two is almost as good, and so the checkmating move is continually postponed. Black meanwhile manages to advance a Pawn, promote it and eventually even wins the game. Played at the second U.S. championship: Coko III (White) v Genie (Black).

White can, of course, checkmate by Q-N2 and the same comment applies for the next six moves. However, the game continued:

1.K-B1, P-KB4; 2. K-B2, P-B5; 3. K-B1, P-N5; 4. K-B2, P-B6; 5. K-B1, PXP; 6. K-B2, PXR=Q;

Inexplicably, White now makes a more serious blunder. The remainder of the game is horrible.

7. K-B1?? QXBch; 8. K-Q2, QXPch; 9. K-B1, Q-N8ch; 10. K-B2, QXP(R7)ch; 11. K-B1, Q-R8ch; 12. K-B2, Q-QN8ch; 13. K-Q2, P-N6; 14. Q-B4ch, Q-N6; 15. QXQch, KXQ;

White is now lost, but should at least play K-K2 to stop Black's Pawn.

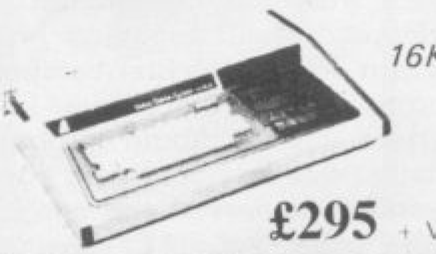
16. P-K4?, KXP; 17. P-K5, P-N7; 18. Resigns.

Is it better to "maintain" a threat or to execute it immediately? There is no simple answer; it depends entirely on the position.

I shall return to this problem next month when I consider the so-called "horizon effect".

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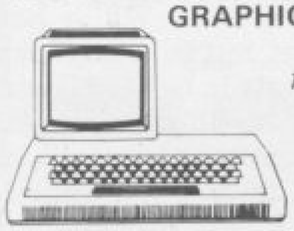
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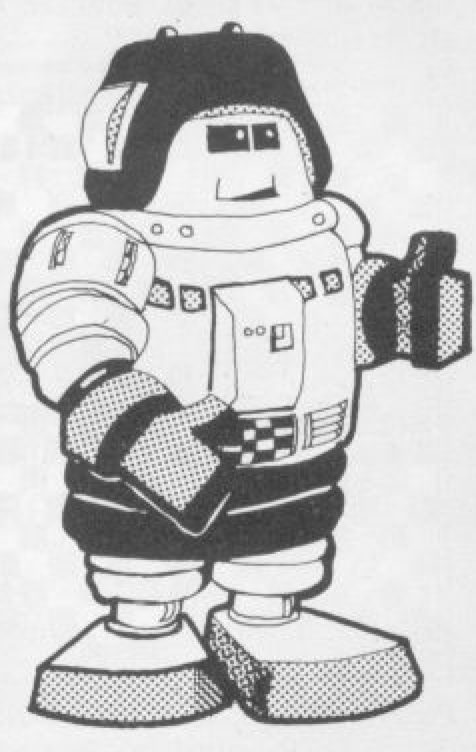
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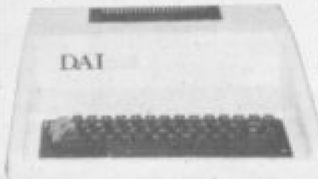
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BRIDGE

A K Q J

BY ALAN HIRON

THE bid to produce a microcomputer able to play a respectable game of bridge has proved an uphill task. The fact that a game of bridge is split into two parts, bidding and playing a hand, poses the programmer very different problems from the game of chess.

The first commercial attempt available in this country was Fidelity Electronics' Bridge Challenger, marketed over here by Computer Games.

Playing a simple bidding system, the Mark I machine (originally selling at just under £300 before being superseded by Mark II) was a very good first attempt at the problem. Considering the man-years (man-centuries?) that had been put into chess-playing machines, a lot had been achieved for bridge in a very short time.

The Bridge Challenger had a lot of interesting features. It could play one, two, three or four of the hands (with humans making up the numbers) and was completely ethical — in other words if it happened to know both the East and West cards on a particular deal it would only attempt to solve the problems that it was set (in both bidding and play) with the information that it knew legitimately.

There were a number of optional features that could be included in the bidding system used (weak or strong no-trump, five-card majors and so on) that made the system usable on both sides of the Atlantic where bidding methods vary considerably. Hands could be dealt with a special pack of magnetized cards and read into the machine without the human players seeing their faces, hands could be replayed and so on.

This was all very satisfactory but by no stretch of the imagination did the quality of the bidding and play live up to good human standard. Although there were one or two enlightened reviews, the majority of bridge correspondents tended to sneer at the machine's sheer lack of bridge ability.

As an exercise, the computer was set to work to compete in "Bidding Challenge", a monthly competition run by *Bridge Magazine* between the current holders and the new challengers. It achieved (somewhat luckily) a score of 47 out of a possible 100 with its human opponents collecting an average expert score of about 80.

There were noticeable weaknesses in the play as well as the bidding and players muttered about the time taken to input a hand, either by reading the cards or by using the keyboard. To a large extent these difficulties have been overcome by Mark II. The bidding and play have improved and there are a large number of pre-dealt hands that can be generated with only a few key depressions — obviously a good idea.

In my next article I will give one or two examples of how Bridge Challenger copes in practice. Furthermore, it has a new rival on the market — Bridgemaster. A short challenge match between the two machines should prove revealing . . .

A new idea, shortly to be released, is for a visual form of the old Auto-Bridge. This is not a playing machine, but simply a tape or two for a particularly well-known home computer that tests your expertise in both bidding and play. And the graphics really are rather fun — in glorious technicolour.

FOR SO LONG, A BRIDGE TOO FAR

The social side of Bridge has encouraged a vast following but not the computerisation which chess players have craved.

In Britain, far more people play bridge, even if only occasionally, than play football or cricket and it is even more popular in the U.S.

I first played around with a computer to play bridge in 1959, but it was a massive water-cooled Mercury and results were long and slow in coming.

In the 60s the problems of getting a machine to play a full game seemed intractable but computers were developed as a short cut to cope with the scoring problems involved in big simultaneous pairs events, played at perhaps 200 centres and where all players tackled the same 24 hands.

It involved some complications in those early days which I will repeat to show how lucky we are to have microcomputers around today.

I played in the very first on-line scored tournament in Ostend in 1964. An IBM machine, special score cards and magnetic pencils were used.

Each scorer marked the card in a special way and the cards subsequently read directly by a card reader. Theory? Excellent! In practice? Disaster? Bridge players, who traditionally never listen to any instructions that they are given, managed to strike out the wrong digits on about one card in two. The eventual manual checking and repair work needed to get everything right took about four times as long as if the event had been scored manually from the word go.

The next idea came from Australia. To prevent people losing their nice magnetic recording pencils and using any stray pen that came to hand, the score-cards were conventional punch cards but with ready made perforations around any digit that might need to be punched. The idea was that any implement could be used to poke out the hole on the card and so register a score that could be read directly.

A big improvement, yes, but players still tended to continue their post-mortems of their most recent disaster and pay insufficient attention to the task in hand. Extra holes were absent-mindedly included — it is great fun pushing out a perforated hole with a pen — and the computer found it remarkably difficult to score a contract of 23 hearts, making 18 tricks — hardly surprising.



A SPARK OF GENIUS

There's a spark of genius behind the new arcade game which is taking America by storm.

Titled Qix (and pronounced kicks), the most remarkable thing about this new game is that it is not tied to any theme. It is a strategic game, pure and simple, with no compromising to make the player think he's saving the Earth or competing in a Grand Prix.

The only thing you are battling in Qix is electricity. It is a game of line drawing, snatching space across the machine while avoiding the many hazards.

To begin with, the screen consists only of four borders down which travel two "Sparx". The player is in charge of a marker at the bottom of the screen and to escape the Sparx he must draw a line upwards into the screen.

The problem is that while drawing, the marker is vulnerable to the Qix a large brightly coloured, randomly travelling spark. If you hesitate in mid-line, you run into the third villain of the piece — the Fuse. A box which is too long being completed will mean the Fuse is lit at the place where the marker left the established lines and rushes up to destroy the hesitating marker.

Those are the hazards, now for the aims. In Qix you have to fill in as much of the screen as you can before one of the hazards does for you. 75% of the screen filled, results in a new screen to tackle.

You can either draw in fast mode or risk the slow mode for double points.

Gradually small boxes fill the screen with tiny lines to dodge the sparx on and next step is a desperate dash to the side to complete a space capturing box.

Just as the player feels he is getting on top of the Sparx, they multiply and become more dangerous and aggressive.

There is one final danger of a careless player's own making. This is known as the spiral death trap and is caused by a player cutting in on himself too soon — at the first hint of a wrong turning, the Fuse is lit and ready to chase the offender down.

Each player will develop his own ideas on strategy and this will be mirrored in the type of space-filling designs he produces. This is a basic outline of the game — we will do more on tactics in a future issue.

U.S. successes are not guaranteed to do well with British players — but there is a strong lobby predicting that Qix will catch on like lightning over here.

CHOPPERS AND TANKS FOR TWO

The odds are really stacked against the defender in Armour Attack.

Panzers are prowling the streets, helicopters hover dangerously overhead and your jeep is the only thing that stands between the town and the occupation force.

Tanks are an increasingly common inhabitant of our arcade machines. While Armour Attack does not compare visually with the excitement of Battle Zone, it does offer plenty of scope for round-the-houses manoeuvring and encourages guerilla hit-and-run tactics from the defender.

The jeep can make quite a dent in the hardware which is trundling through the streets.

The game lends itself to the two-player mode with a second jeep appearing and allowing the players to join forces to defend the town. Individual and team scores are kept in this case.



Tanks must be hit twice to be completely destroyed. The first hit from the jeep merely immobilising the enemy and scores 20 points for the player. A second hit destroys the turret and is worth an additional 30 points.

For each helicopter destroyed the player gets a bonus of 10 points on every tank he finishes off. And after five helicopters are shot down the player receives an extra jeep.

As the game progresses the tanks and helicopters get faster and become more difficult to pick off.

A good tactical game but ignore the manufacturer's claims of "unprecedented realism".

SHUTTLING OFF THIS MORTAL COIL

A small step for man turns into a journey not to be contemplated in Moon Shuttle.

If conquest of space was this tough, America's shuttle would be put back under wraps immediately. The main trouble in this game is that the Prince of Darkness has set up his forces between you and the moon with the sworn aim of preventing anyone reaching there. He is helped in this by a meteorite storm which travels across the screen and has to be crossed by your craft.

Blasting a pathway though the meteorites is only the start of your problems, though, as the Prince of Darkness' troops, consisting of such horrors as: Blob Men, Men-O-War and Bomb Launchers, do their best to keep the moon uninhabited.

Good colourful graphics but the Apollo mission never had it this tough.

ACTION TIPS

YOU CAN'T KEEP A GOOD FROG DOWN

A frog is back in the arcade news in one of the strangest game concepts currently going the rounds.

Frog and Spiders puts the player in the amphibious title role in a real tangled web of wildlife drama.

The frog develops from a tadpole quickly to take up position at the bottom of the screen while spiders weave a massive web above him. Using the fire button the frog must shoot down the spiders, once to knock them down, twice to kill them. The spiders fire back, naturally, but a bigger danger is the snake who slithers out along the bottom of the screen and will bite the frog unless the creature can jump over him.

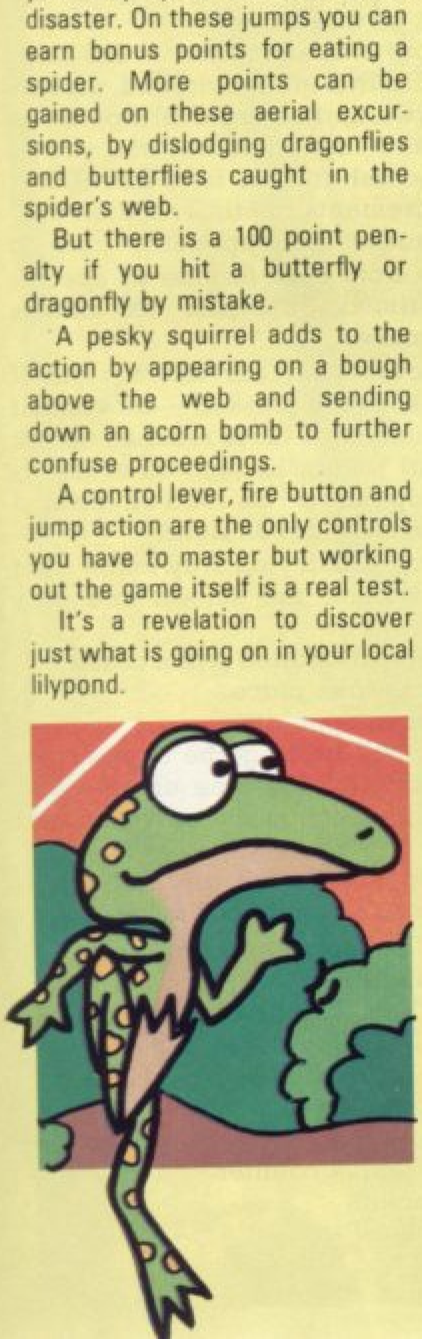
But don't hop into a bee on your way up as this also spells disaster. On these jumps you can earn bonus points for eating a spider. More points can be gained on these aerial excursions, by dislodging dragonflies and butterflies caught in the spider's web.

But there is a 100 point penalty if you hit a butterfly or dragonfly by mistake.

A pesky squirrel adds to the action by appearing on a bough above the web and sending down an acorn bomb to further confuse proceedings.

A control lever, fire button and jump action are the only controls you have to master but working out the game itself is a real test.

It's a revelation to discover just what is going on in your local lilypond.





BUTTONS GALORE

Many an arcade player has written off Defender as requiring one more hand than the usual human complement.

Its awesome array of buttons and deadly collection of six alien craft seem to defy mastery. And yet those who have persevered with Defender are the most devoted of players, swearing by the game as the most complete and satisfying tactically.

All this may sound like heresy to those of us who spent a small fortune on the game and came away short-changed on time and none the wiser on its winning ways.

The fact is Defender does not tolerate learners easily. While space invaders could be played and enjoyed without an understanding of the tactics, Defender comes across as a blurr of action, culminating in unavoidable death at the hands of a whole collection of seemingly better-equipped alien craft.

Followers of the game have already given this column a taste of their fervour with many requests to feature the game in the "Tips" section.

The most interesting "bug" we have been told about on the machine, comes courtesy of M. Healey who claims:

When you shoot a Lander and rescue the humanoid under your ship, it is not always necessary to put him down. You can continue saving and storing the men under the ship until you have six or seven under there. This will produce some interesting effects when all six are put on the ground . . . like some men appearing at the top of the screen, making Briters (the fast green U.F.O.s) disappear and having the effect of "hyperspace" on your craft and other things on the screen.

DEFENCE IS THE KEY

Newcomers to Defender do not realise how apt the title is, for unless you protect the humanoids who inhabit the planet's surface, your own demise follows swiftly.

When the last of the 10 humanoids you must protect, is taken to the top of the screen by a Lander craft, the screen gives a definite shudder and the entire alien attack wave descends on you at once — even the best Defender players soon lose lives in this situation.

Each batch of humanoids must be protected for four attack waves before another 10 are placed in your care and they are worth much more to the player than mere bonuses.

The six alien craft that inhabit the Defender machine are, in reality, only four. The fast and deadly Mutants are Landers that have fulfilled their mission of taking a kidnapped humanoid to the top of the screen.

The Swarmers are the remnants of an exploded Pod. Bombers, which with Landers, make up the bulk of any screen's attack force, seed space with small bombs which can be unwittingly flown into.

And finally Briters, the seemingly unshakable green U.F.O.s, whose main purpose is to keep the player on the move. Any dallying and one of these horrors will be despatched to prompt the player to speed up.

In Defender some of the action takes place off-screen on the radar area. Many players mis-use this feature as a way of lining up their next alien victim, it should be used to keep a check on any Lander trying to smuggle a man off the surface.

Three smart bombs are given to the player at the start of the game and one more, plus one more life, is added with every 10,000 points scored.

These should be saved, if possible, until the beginning of the third wave, then the high scoring Pods are waiting in force and all can be destroyed complete with their Swarming cargo by one bomb. Note: if only one Pod is on the screen when the bomb is detonated its Swarmers will be released.

Hyperspace is seldom used as it is very hard to find in a panic. But if you do use it and find yourself materialising in a situation just as deadly as the one you just escaped from, it is possible to press the button again before you have fully materialised.

Humanoids being lifted off the planet's surface should be the prime consideration. If the kidnapping Lander is shot before he gets too high, the man falls safely back to earth.

STREET TALK

Perhaps it is a sign of the concentration needed to play Defender that very few sayings connected with the game were brought to our attention.

The only two we overheard were:

- One to hang onto — referring to the all-important last humanoid who can be collected under the craft to prevent his being grabbed by the Landers.
- Mountain hugging — the tactic of flying low just above the horizon to blast Landers before they take captives too high.

SPEED RACE RUNS ON A TEXAS INSTRUMENTS 99/4



WRITTEN IN T.I. EXTENDED BASIC by Stephen Shaw

SPEED RACE

Dear Sir,

Glad to see your mag. Although you carry programs for almost every type of competition, you missed the T.I. 99/4, now selling faster than T.I. can import it. Sales will shoot up when the modified 99/4a get in — so watch for it.

To rectify your omission I enclose a sample program written in T.I. extended Basic. This makes use of Sprites, smoothly moving characters, to imitate the Sega game Monaco G.P.

PROGRAM DOCUMENTATION

Up to line 120 sets direction of other cars.

Lines 130-140 define special characters:

CHAR 100 is the cars, 110 is the road edge, 105 the crash barriers.

CALL SPRITE initiates the sprites, with sprite number character code, colour, initial positions and initial velocities.

Sprites 6 upwards are the crash barriers.

Line 333 sets the colour of the road, drawn in line 332.

Line 325 sets the colour of the road, edge, drawn in line 334, also defined in line 334.

Lines 340-360 initiate the four opponent cars, 370 initiates your car. Your car is stationary, as are the others, at this stage.

The core of the program is 390-520.

CALL COINC, dotted around, discovers if two sprites are overlapping at that exact instant. If they are, you go to the crash routine from line 900.

470 increments the timer & distance.

490 causes the opponents' cars to weave from side to side at specifically timed intervals. 500 makes them move.

440 moves your car left & right if arrow keys are pressed — movement continues until 420 is reached again: internal timing is such as to naturally stop car just on road on left and on hard shoulder on right.

To cheat, crash your way to the right hand side of the screen and stay there!

910 stops all motion while crash calculations take place.

930 invokes penalty.

932/933 will bring game to end after 15 crashes of 200 time units — but note this section is only reached after a crash!

935 and 936 restore original conditions re:- opponent car movement.

940-960 put opponents back in place.

VARIABLES

V- The ASCII Code of key pressed.

CT AND X- Counters

Speed-Relative speed

T- Elapsed time

S- Distance

Crash- Crash counter

M- Direction

```
10 CALL CLEAR
20 PRINT "SPEEDRACE":"COPYRIGHT
1981":"BY STEPHEN SHAW":"10,ALST
ONE ROAD,STOCKPORT":"CHESHIRE
SK4 5AH": : :
30 PRINT "USE S & D TO MOVE ":"L
EFT & RIGHT":"     ":"USE KEYS 1,
2,3,&4 TO":"SELECT GEAR"
40 PRINT "TIME & DISTANCE ARE ":
"DISPLAYED.":"DISTANCE SUFFERS I
F YOU":"CRASH"
50 PRINT "PRESS ANY KEY TO CONTI
NUE"
60 CALL KEY(0,V,M)
70 IF M<1 THEN 60
80 CALL SCREEN(2)
90 FOR X=1 TO 100 :: NEXT X
100 CALL CLEAR
110 CALL MAGNIFY(3)
120 M=1
130 CALL CHAR(100,"96FEBA3838BAF
EBA")
135 CALL CHAR(110,"5A5A5A5A5A5A5
A5A5A")
140 CALL CHAR(105,"FF0000000000
000FF")
150 CALL SCREEN(4)
160 CALL SPRITE(#6,110,13,80,1,9
0,0)
170 CALL SPRITE(#7,105,13,75,17,
90,0)
180 CALL SPRITE(#8,105,13,70,30,
90,0)
190 CALL SPRITE(#9,110,13,65,1,9
0,0)
200 CALL SPRITE(#10,105,13,60,17
,90,0)
210 CALL SPRITE(#11,105,13,55,30
,90,0)
220 CALL SPRITE(#12,105,13,50,1,
90,0)
230 CALL SPRITE(#13,105,13,45,17
,90,0)
240 CALL SPRITE(#14,105,13,40,30
,90,0)
250 CALL SPRITE(#15,105,13,85,14
5,90,0)
260 CALL SPRITE(#16,105,13,80,15
7,90,0)
270 CALL SPRITE(#17,110,13,75,17
6,90,0)
280 CALL SPRITE(#18,105,13,70,14
5,90,0)
290 CALL SPRITE(#19,105,13,65,15
7,90,0)
300 CALL SPRITE(#20,105,13,60,17
3,90,0)
310 CALL SPRITE(#21,105,13,55,14
5,90,0)
320 CALL SPRITE(#22,105,13,50,15
7,90,0)
325 CALL COLOR(8,3,4)
330 CALL SPRITE(#23,110,13,45,17
3,90,0)
332 CALL VCHAR(1,8,140,216)
333 CALL COLOR(14,12,12)
334 CALL VCHAR(1,7,95,24):: CALL
 VCHAR(1,17,95,24):: CALL CHAR(9
5,"5555555555555555")
340 FOR CT=1 TO 4
350 CALL SPRITE(#CT,100,CT+6,CT*
47-45,93-CT*8,0,0)
360 NEXT CT
370 CALL SPRITE(#5,100,16,160,74
,0,0)
380 REM **
390 REM    ***
400 CALL SOUND(-1000,-2,30-7*SPE
ED)
410 CALL COINC(ALL,D):: IF D<0 T
HEN GOSUB 900
420 CALL KEY(0,A,B):: IF A=ASC("
S")THEN CALL MOTION(#5,0,-10)
430 IF A=ASC("D")THEN CALL MOTIO
N(#5,0,10)
440 IF A<30 THEN CALL MOTION(#5,
0,0)
450 CALL COINC(ALL,D):: IF D<0 T
HEN GOSUB 900
460 IF A>48 AND A<53 THEN SPEED=
(A-48)/3
461 CALL COINC(ALL,D):: IF D<0 T
HEN GOTO 521
470 T=T+1 :: S=S+6*SPEED :: DISP
LAY AT(10,18)SIZE(10):STR$(S)&"
 "&STR$(T)
480 CALL COINC(ALL,D):: IF D<0 T
HEN GOTO 521
490 IF T/5=INT(T/5)THEN M=-M
500 CALL MOTION(#1,SPEED*40,M*5,
#2,SPEED*40,M*5,#3,SPEED*40,M*5,
#4,SPEED*40,M*5)
501 CALL COINC(ALL,D):: IF D<0 T
HEN GOSUB 900
520 GOTO 400
521 GOSUB 900
522 GOTO 400
900 CALL SOUND(-900,-6,0)
910 CALL MOTION(#1,0,0,#2,0,0,#3
,0,0,#4,0,0,#5,0,0)
920 SPEED=1/3
930 S=S-50
931 IF S<0 THEN S=0
932 CRASH=CRASH+1
933 IF CRASH=15 OR T>200 THEN GO
TO 2000
935 M=+1
936 T=T-(5*(T/5-INT(T/5)))
940 FOR CT=1 TO 4
950 CALL SPRITE(#CT,100,CT+6,CT*
47-45,93-CT*8,0,0)
960 NEXT CT
965 SPEED=0
970 RETURN
2000 CALL CLEAR
2010 PRINT "YOU HAVE TRAVELLED A
 ":"A DISTANCE OF ";S
2020 PRINT "AND HAD ";CRASH;" CR
ASHES!"
2030 IF S>500 THEN PRINT "YOU AR
E NOT A BAD DRIVER"
2040 IF S<100 THEN PRINT "YOU SH
OULD NOT BE ON THE":"ROAD"
2050 PRINT "TO TRY AGAIN,ENTER '
RUN'"
2060 END
2070 END
2080 END
2090 END
```



BY STAN OCKERS

RUNS ON AN ATARI IN 8K

CHANGING HEAR

Anyone who had a heart would not have invented this puzzle game. Simple to play yet challenging to work-out, Changing Hearts is an unusual problem which is well suited to the computer.

The object of the game is to change a pattern of dark hearts surrounding a light coloured one to a pattern of light hearts, surrounding a dark one.

As you select individual hearts, different groups of hearts will be complemented depending on your choice. Selecting a corner will change four hearts in a square including that corner. Choosing a heart at the middle of an edge will reverse all hearts along that edge. Finally, if the central heart is chosen, all hearts in a cross will be switched.

The first challenge is simply to solve this puzzle without losing any hair. A higher challenge is to solve it in the fewest moves possible. Supposedly, this number is eleven. If at any time you wish to return to the starting position, press the letter "I", (initialise). This will cost you a turn, however.

You can save yourself a lot of typing from omitting the instructions (lines 1000-1110), and deleting line 60.

Of interest to programmers will be the extensive use of strings to hold integer numbers (0-255). There are a number of good reasons for doing this. First, a single character in a string requires much less memory than a number (two bytes compared to seven). The numbers can be retrieved easily using Atari's string splitting convention (see line 900).

String comparison is also useful for comparing entire groups of numbers at once. Notice how easy it is to check for a win or less in lines 250 and 260. The numbers are entered into strings as control graphics.

Many lines in "Changing Hearts" contain special control characters which DO NOT show up in this listing. To enter these special characters, hold the control key down while typing the upper case letters and the commas below:

Line 30: P$ should contain HCJCLCHEJELEHGJGLG

Line 40: G$ contains ABDE, ABC, BCEF, ADG,, BDEFHCFI, DEGH, GHI,, EFHI,

Lines 410-440 contain graphics in their PRINT statement as follows:

Line 410: QRWRWRE
Line 420: ARSRSRD
Line 430: ARSRSRD
Line 440: ZRXRXRC

In lines 1000 and 1010, there should be two control commas (heart characters) in each line PRINT statement. The first one after the open parenthesis character, and one before the closing parenthesis character, and one before the closing parenthesis. The first heart in line 1000, and the second one in line 1010, should also be typed in reverse video, as should the word "light" in lines 220 and 1010.

PROGRAM EXPLANATION

Lines 10-40: The keyboard is opened for input to get keys without requiring a RETURN. Various strings are initialised. See the instruction for special comments concerning P$ and G$.

Lines 50-60: Title — The hearts blink in and out because of the POKEs which change from upper-case to lower-case graphics mode and back (POKEs into 756).

Lines 170-180: Initialise game — The board is printed along with the initial heart configuration.

Line 190-270: Main loop of game — Gets player selection, checks for legal move, flashes appropriate group and complements hearts in that group, checks for winning or losing situations and repeats. CHR$(125) clears the text area.

Lines 300-310: Advises of a losing condition.

Lines 350-380: Acknowledges a win, small demonstration, asks if repeat wanted. The POKEs into 708 are another way to change colours (colour register 0). The POKEs into 656 and 657 align the cursor in the text area (row and column). The POKE into 76 clears the last key byte.

Lines 400-450: Subroutine to print the board. The SETCOLOR 4,2,8 is necessary so the background hearts in graphics mode 2 don't show because they are the same colour as the background. The SETCOLOR 3,4,10 makes the light hearts especially light so they show up well on a black and white TV. CHR$(124) creates the vertical lines, completing squares. The POKE into 752 blanks the cursor.

Lines 500-550: Subroutine to put hearts on the board. Flag F controls the configuration printed as described under variables.

Lines 600-620: Subroutine which flashes hearts in a group determined by the number selected, N. The subroutine then complements these hearts.

Lines 700-730: Delay subroutine used during instructions and in winning and losing routines. Delay determined by point where entered.

Lines 750-770: Keyboard input subroutines which prompts and waits for any key to be pressed.

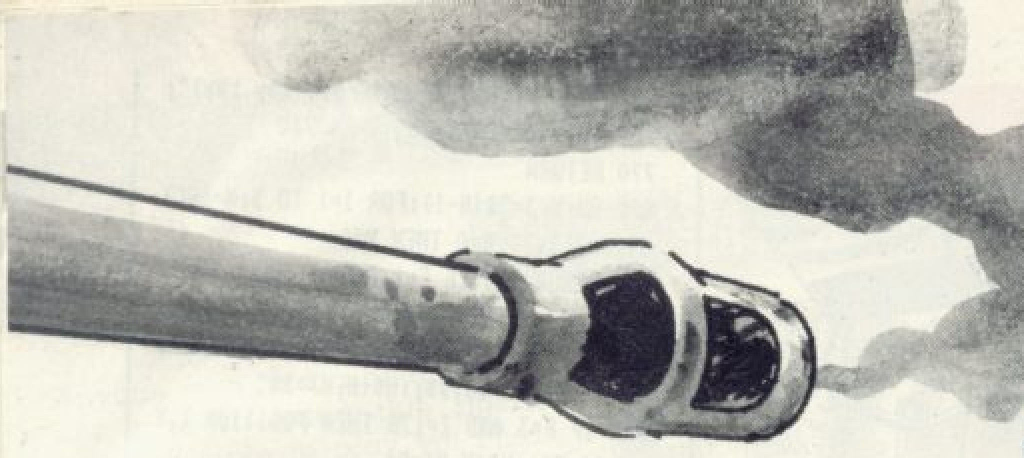
Lines 800-850: A subroutine which operates on a group of positions determined by the number N. Hearts may be printed, erased or complemented depending on the flag F.

Line 900: Subroutine to retrieve screen positions from string P$.

Line 1000-1110: Instructions



```
10 DIM P$(18),G$(45),B$(1),D$(1),H$(9)
,F$(9),L$(9),S$(9),N$(9):OPEN #1,4,0,"
K:"
20 D$=CHR$(160):B$=CHR$(128):FOR I=1 T
O 9:L$(I)=D$:F$(I)=B$:NEXT I:S$=L$:S$(
5,5)=B$:F$(5,5)=D$
30 P$="                    ":N$="1234567
89"
40 G$="
            "
50 GRAPHICS 2:POSITION 2,5:? #6;"CHANG
ING HEARTS":FOR I=3 TO 6:SETCOLOR 0,I,
4:SOUND 0,RND(0)*40+10,10,8
55 GOSUB 710:POKE 756,226:SOUND 0,RND(
0)*40+10,10,8:GOSUB 710:POKE 756,224:N
EXT I:SOUND 0,0,0,0
60 POKE 752,1:? :? ,"Need Instructions
?":? ,"    ( Y or N )":GET #1,K:IF K=8
9 THEN GOSUB 1000
170 T=0
180 H$=S$:GOSUB 400:F=2:GOSUB 500
190 T=T+1
200 ? CHR$(125);"Turn # ";T:? "Pick a
number (1-9)"
210 GET #1,K:N=K-48:IF N=25 THEN 180
215 IF N<1 OR N>9 THEN 210
220 GOSUB 900:GET #6,H:IF H=160 THEN ?
 CHR$(125):? :? "You may only pick lig
ht hearts.":GOSUB 760:GOTO 210
250 GOSUB 600:IF H$=L$ THEN 300
260 IF H$=F$ THEN 350
270 GOTO 190
300 FOR S=30 TO 190:SOUND 0,S,10,8:NEX
T S:SOUND 0,0,0,0:? CHR$(125):? "Sorry
, there's no way out !!!":GOSUB 750
310 GOTO 370
350 ? CHR$(125):FOR J=0 TO 14:POKE 708
,4+16*J:SOUND 0,50-2*J,10,8:GOSUB 730:
POKE 708,40:GOSUB 730
351 NEXT J:SOUND 0,0,0,0
360 POKE 656,1:POKE 657,10:? "CONGRATU
LATIONS !!!":? "You did it in ";T;" tu
rns.":GOSUB 750
370 POKE 764,255:? CHR$(125):? :? "Car
e to try again? (Y or N)":GET #1,K:IF
K=89 THEN 170
380 ? "Thanks for the game.":END
400 GRAPHICS 2:SETCOLOR 4,2,8:SETCOLOR
 3,4,10:POKE 756,226:POKE 752,1
410 POSITION 7,2:? #6;"       "
420 POSITION 7,4:? #6;"       "
430 POSITION 7,6:? #6;"       "
440 POSITION 7,8:? #6;"       "
450 FOR X=7 TO 13 STEP 2:FOR Y=3 TO 7
STEP 2:POSITION X,Y:? #6;CHR$(124);:NE
XT Y:NEXT X:RETURN
500 FOR N=1 TO 9:GOSUB 900:IF F=1 THEN
 ? #6;H$(N,N);
510 IF F=2 THEN ? #6;S$(N,N);
520 IF F=3 THEN ? #6;F$(N,N);
530 IF F=4 THEN ? #6;N$(N,N);
540 IF F=5 THEN ? #6;L$(N,N);
550 NEXT N:RETURN
600 FOR L=1 TO 5:F=1:GOSUB 800:SOUND 0
,5*N+50,10,8:F=2:GOSUB 800:SOUND 0,5*N
+80,10,8
620 NEXT L:SOUND 0,0,0,0:F=3:GOSUB 800
:RETURN
700 FOR K=0 TO C:NEXT K:RETURN
710 C=150:GOTO 700
720 C=1000:GOTO 700
730 C=30:GOTO 700
750 POKE 764,255:? ,"(Press any key)";
760 IF PEEK(764)=255 THEN 760
770 RETURN
800 SN=N:J=5*(N-1):FOR I=1 TO 5:N=ASC(
G$(J+I)):IF N=0 THEN 850
810 GOSUB 900:IF F=1 THEN ? #6;" ";
820 IF F=2 THEN ? #6;H$(N,N);
830 GET #6,Z:IF F=3 AND Z=160 THEN POS
ITION X,Y:? #6;B$;:H$(N,N)=B$
840 IF F=3 AND Z=128 THEN POSITION X,Y
:? #6;D$;:H$(N,N)=D$
850 NEXT I:N=SN:RETURN
900 X=ASC(P$(2*N-1)):Y=ASC(P$(2*N)):PO
SITION X,Y:RETURN
1000 H$=S$:GOSUB 400:F=2:GOSUB 500:? "
Go from this pattern ...":? ,"( 's aro
und  )":GOSUB 750
1010 F=3:GOSUB 500:? CHR$(125);"To thi
s pattern ( 's around  )":? "by choosi
ng light hearts.":GOSUB 750
1020 GRAPHICS 2:F=4:GOSUB 500:POKE 752
,1:? "These are the position numbers."
:? "Different groups of hearts will be
"
1030 ? "reversed depending on your cho
ice.":GOSUB 750:F=2:GOSUB 400:GOSUB 50
0
1040 ? "If you pick the center square,
 the":? "hearts in a cross will be rev
ersed."
1050 GOSUB 720:N=5:GOSUB 600:GOSUB 750
:? CHR$(125);"If you choose the middle
 square on"
1060 ? "an edge, the whole edge will b
e":? "reversed.":GOSUB 720:N=8:GOSUB 6
00:GOSUB 750
1070 ? CHR$(125);"If you pick a corner
, a square":? "including that corner w
ill be":? "reversed"
1080 GOSUB 720:N=7:GOSUB 600:GOSUB 750
:? CHR$(125);"If you end up with all d
ark hearts":? "you lose !!!":F=5
1090 GOSUB 500:GOSUB 750:? CHR$(125);"
Hit the 'I' key to get back to the":?
"initial position."
1100 ? "Understand the instructions?":
POKE 764,255:GET #1,K:IF K<>89 THEN 10
00
1110 RETURN
```



TANK BATTLE

BY ALISTAIR HUTCHEON

RUNS ON A SHARP MZ-80K

Stalk your opponent's tank through the minefields and barriers of the Sharp MZ-80K battlefield.

In Tank Battle, two tank commanders guide their war machines around the screen waiting for an opening to fire or to force their opponent over a mine.

Points are scored if you hit the opposing tank and if your opponent sets off a mine. The winner is the first to 10 points. Barriers can be destroyed by two direct hits to force your way through to surprise a hiding opponent.

Each player controls his tank from a 3x3 section of keys at either end of the keyboard. The eight outside keys give direction and the centre key fires a shot in the direction of the last move.

Tank conflicts have proved a successful convert to the computer screen — and this game by Alistair Hutcheon incorporates most of the features of that success.

```
1 PRINT "▧▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚"
3 PRINT"▚▚▚TANK BATTLE Adapted for MZ-80K by▚▚▚"
5 PRINT"▒▒▒▒▒▒▒      Alistair Hutcheon      ▒▒▒▒▒▒▒"
7 PRINT"▩▩▩▩                 TANK BATTLE"
9 PRINT
11 PRINT"                                 "
13 PRINT"                                  "
15 PRINT"                                  "
17 PRINT"                                  "
19 PRINT"                                    "
21 PRINT"                                  "
23 PRINT"                                    "
25 PRINT"                                    "
27 PRINT"                                    "
29 PRINT"▩▩"
31 PRINT"▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚▚"
33 USR(62)
34 MUSIC"C0DEFGFEDC"
35 PRINT"       Press Return To Continue"
37 GET T$:IF T$="" THEN 37
39 PRINT"▧                INSTRUCTIONS"
41 PRINT
43 PRINT"    The object of the game is the first  person to score ten points."
45 PRINT"Points are won in two ways......."
47 PRINT"1.BY SHOOTING OPPONENT'S TANK."
49 PRINT"2.IF OPPONENT STEPS ON A MINE"
51 PRINT
53 PRINT"If a shell hits a barrier'▩' ";
55 PRINT"it will be half destroyed."
57 PRINT"The next hit will destroy the barrier   completely."
59 PRINT:PRINT"The two tanks are denoted as O and ●."
61 PRINT"Each has 9 controls as shown;"
63 PRINT:PRINT"Player 1's controls are:-":PRINT"      1 2 3"
65 PRINT"      Q W E"
67 PRINT"      A S D":PRINT
69 PRINT"      Player 2 has a similar 3X3 pad at the top right of";
71 PRINT"the keyboard":USR(62)
```



```
73 PRINT"      Press Return To Continue"
75 GET J$:IF J$="" THEN 75
77 PRINT"▣To move 1 square in any direction press"
79 PRINT"the key in that direction from the      centre key."
81 PRINT"The centre key fires a shell in the     direction of your last move."
83 PRINT:PRINT"   ※ = BARRIER"
85 PRINT:PRINT"   . = MINE    "
87 USR(62)
89 PRINT"▣▣▣            Press Return To Start"
91 GET J$:IF J$="" THEN 91
93 GOSUB 243:PRINT"▣"
95 FOR X=0 TO 39
97 POKE 53248+X,208:POKE 54048+X,208
99 NEXT X
101 FOR Y=1 TO 19
103 POKE 53248+40*Y,208:POKE 53287+40*Y,208
105 NEXT Y
107 USR(62)
109 FOR Y=1 TO 19
111 FOR X=1 TO 38
113 R=RND(1)*10
115 IF (R>8.9)*(R<9.65)THEN POKE 53248+40*Y+X,46:USR(62)
117 IF R>9.65 THEN POKE 53248+40*Y+X,166:MUSIC"_C0"
119 NEXT X:NEXT Y
121 LV=10:LH=3:RV=10:RH=36
123 M=0
125 POKE 53651,71:MUSIC"‾#B0":POKE 53684,72:MUSIC"‾#B0"
127 REM***AND NOW TO GET CONTROL***
129 POKE 54141,SL+32:POKE 54154,SR+32
131 IF (SL=10)+(SR=10) THEN 231
133 IF (SL=10)+(SR=10) THEN 231
135 A$=""
137 GET A$:IF A$="" THEN 137
139 IF(A$="A")+(A$="‾") THEN R=-1:D=1
141 IF (A$="S")+(A$="▌") THEN R=0:D=1
```



We can all help if we care enough...

A Special from Educational Computing

Many people regard computers as some form of man-made monster, heralding the advent of an era where machines are the masters of men. The emergence of microcomputers in the mid-seventies has helped to overcome this misguided view of how computers will affect our lives.

Each month, Educational Computing shows the tremendous advances being made in the enhancement of computers, particularly micros, as teaching aids. In this annual issue, **Learning to cope — computers in special education,** we look at the marvellous achievements of many very dedicated people working with disabled and mentally-handicapped children.

Tremendous progress is being made in this area, brought about by a mixture of ingenuity, flexibility and determination on behalf of the manufacturers of specially-adapted products, writers of applications software, nurses and teachers putting ideas into practice and the children themselves.

In our annual, we look at the latest developments in special education. You can read about the many fascinating applications of microelectronics in this field, what the people involved think and what the future holds in store. Most important of all, you can find if you can help — even in a small way.

Learning to cope — computers in special education £1.50

Please send me a copy of *Learning to cope — computers in special education.*
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Now please post to: Learning to cope — computers in special education, 8 Herbal Hill, London EC1 5JB.



```
143 IF(A$="D")+(A$="⅌") THEN R=1:D=1
145 IF(A$="Q")+(A$="L") THEN R=-1:D=0
147 IF(A$="W")+(A$="┘") THEN 191
149 IF(A$="E")+(A$="ᵔᵔ") THEN R=1:D=0
151 IF(A$="1")+(A$="├") THEN R=-1:D=-1
153 IF(A$="2")+(A$="┴") THEN R=0:D=-1
155 IF(A$="3")+(A$="⁑") THEN R=1:D=-1
157 IF(R=0)*(D=0)THEN 135
159 REM****CONTROL INPUT****
161 LL=ASC(A$)
163 IF LL>100 THEN RR=R:RD=D:V=RV:H=RH:P=72:S=SL:M=RM
165 IF LL<100 THEN LR=R:LD=D:V=LV:H=LH:P=71:S=SR:M=LM
167 C=53248+H+40*V
169 N=53248+H+R+40*(V+D)
171 IF(PEEK(N)>70)*(PEEK(N)<>46)THEN 127
173 IF(PEEK(N)=0)THEN POKE C,M:M=0:POKE N,P
175 IF PEEK(N)=46 THEN POKE C,M
177 IF PEEK(N)=46 THEN M=46:POKE N,P:GOSUB245:GOSUB217:S=S+1
179 H=H+R:V=V+D
181 LL=ASC(A$)
183 IF LL>100 THEN RV=V:RH=H:SL=S:RM=M
185 IF LL<100 THEN LV=V:LH=H:SR=S:LM=M
187 GOTO 127
189 REM*****TANK MOVEMENT********
191 IF A$="┘" THEN V=RV:H=RH:R=RR:D=RD:Q=72
193 IF A$="W" THEN V=LV:H=LH:R=LR:D=LD:Q=71
195 MUSIC"‾A0"
197 C=53248+H+40*V
199 N=53248+H+R+40*(V+D)
201 IF PEEK(N)=0 THEN POKE C,Q:POKE N,68:H=H+R:V=V+D:Q=0:GOTO 197
203 IF PEEK(N)=212 THEN POKE C,Q:GOSUB 217:POKE N,0:GOTO 127
205 IF PEEK(N)=166 THEN POKE C,Q:GOSUB 217:POKE N,212:GOTO 127
207 IF PEEK(N)=46 THEN POKE C,Q:POKE N,68:H=H+R:V=V+D:Q=46:GOTO 197
209 IF PEEK(N)=71 THEN SR=SR+1:POKE C,Q:GOSUB 217:GOTO 127
211 IF PEEK(N)=72 THEN SL=SL+1:POKE C,Q:GOSUB 217:GOTO 127
213 IF PEEK(N)>200 THEN POKE C,Q:GOTO 127
215 REM****FIRE MISSILES********
217 REM***EXPLOSION***
219 Z1=PEEK(N+1):Z2=PEEK(N-1):Z3=PEEK(N+40):Z4=PEEK(N-40)
221 POKE N+1,247:POKE N-1,247:POKE N+40,247:POKE N-40,247
223 POKE N+1,Z1:POKE N-1,Z2:POKE N+40,Z3:POKE N-40,Z4
225 MUSIC"_C0_D_C_D_"
227 RETURN
229 REM******EXPLOSION SUBROUTINE********"
231 IF SL=10 THEN A$="LEFT"
233 IF SR=10 THEN A$="RIGHT"
235 PRINT"▒▒▒▒▒THE GAME WAS WON BY THE ";A$,"PLAYER"
237 INPUT"ANOTHER GAME?";A$
239 IF LEFT$(A$,1)="Y" THEN GOSUB 243:GOTO 93
241 END
243 A$="":R=0:D=0:SL=0:SR=0:LM=0:RM=0:RETURN
245 POKE 4514,1
247 FOR T=0 TO 255
249 POKE 4513,T
251 USR(68)
253 NEXT T
255 RETURN
```

TANK BATTLE

RUNS ON AN APPLE II

TREASURE HUNT



"Treasure" is the word on the lips of the good people of Marpletownship. Rumours abound that the Marple Caves abound with treasures — 20 of them — and all as close to priceless as only an adventure game can make them.

Of course, there's a catch, for the rumours also cater for a dragon, a band of pirates without a scruple between them, elves, bats, magicians, invisible dogs and other even wierder beings.

On top of this, whisper the talkative townfolk, the caves themselves are in poor condition, there are deep pits into which many have fallen and died. And in some places the roof leaves a lot to be desired.

Can anyone be brave and foolish enough to wander unarmed into these caves in search of a sprinkling of rubies, pearls, gold coins, diamonds, emeralds, a silver bell, a gold watch, a golden harp, a magic wand and other riches? Yes! In fact, they'll be queuing up to roam around down there and you won't be able to talk them out of there until they have grabbed all 20 treasures.

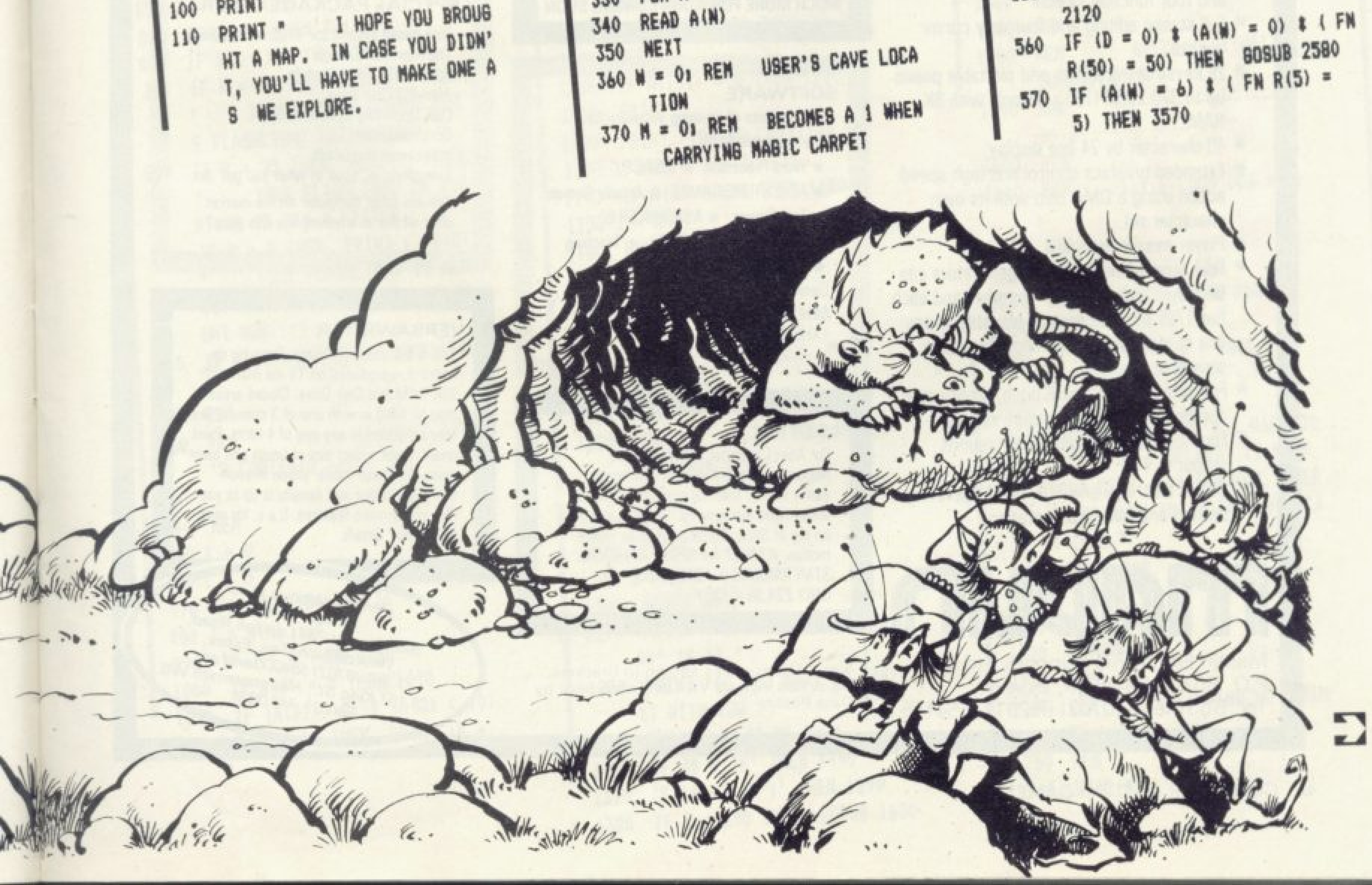
The first one to escape being eaten by a dragon, enchanted by a magician, or robbed by a pirate and who can find his way back to the cave entrance with all the treasures will find the good people of Marpletownship only too keen to offer him their goods (at a reasonable price, of course) and talk long and hard about many worthwhile investments. Lance Micklus has invented an enjoyable adventure (translated for the Apple by Murray Summers) which has a good line in throwaway humour. Key it in and try your hand at the best get-rich-quick campaign since daily paper bingo.

BY MURRAY SUMMERS



PIRATES, PERIL AND PRICELESS PLUNDER . . .

```
1  REM TRANSLATED FOR APPLE ][ BY
2  REM            BY
3  REM      MURRAY R. SUMMERS
4  REM
6  REM
7  REM
9  REM
10  TEXT : HOME : DIM A(425)
20  PRINT : PRINT
30  PRINT "          T R E A S U R E
      H U N T"
35  REM  BY LANCE MICKLUS
36  REM      WINOOSKI VERMONT
40  PRINT
50  PRINT
60  DEF  FN R(X) =  INT ( RND (1)
     * X) + 1
70  PRINT "     THE MARPLE CAVES,
     LOCATED IN MARPLETOWNSHIP,
     PA, ARE SAID TO HAVE 20 HIDD
     ENTREASURES IN THEM.  FEW EX
     PLORE THEM    BECAUSE IT IS
     SAID THAT PIRATES AND"
80  PRINT "DRAGONS LIVE THERE --
     BESIDES, THERE AREDEEP PITS
     WHICH MANY HAVE FALLEN INTO
     AND DIED!"
90  PRINT : PRINT "     YOU, A SM
     ART AND BRAVE HUMAN, AND  I,
     AN ALERT APPLE ][ , WILL EX
     PLORE THE CAVES AND TRY TO F
     IND THE TREASURE.  I  WILL B
     E YOUR EYES AND EARS, AND WI
     LL     TELL YOU IF DANGER LUR
     KS AHEAD."
100  PRINT
110  PRINT "     I HOPE YOU BROUG
     HT A MAP.  IN CASE YOU DIDN'
     T, YOU'LL HAVE TO MAKE ONE A
     S  WE EXPLORE.
120  PRINT : PRINT "     HIT ANY
     KEY TO CONTINUE";: CALL  - 7
     56
130  HOME
140  FOR I = 1 TO 3
150 N = 3 +  FN R(88)
160  IF A(N) <  > 0 THEN 150
170 A(N) = 2
180  NEXT
190  FOR I = 3 TO 9
200 N = 3 +  FN R(88)
210  IF A(N) <  > 0 THEN 200
220 A(N) = I
230  NEXT
240  FOR I = 288 TO 304
250 N =  FN R(94)
260  IF A(N) <  > 0 THEN 250
270 A(N) = I
280  NEXT
290  RESTORE
300  FOR N = 1 TO 23
310  READ A$
320  NEXT
330  FOR N = 137 TO 421
340  READ A(N)
350  NEXT
360 W = 0: REM  USER'S CAVE LOCA
     TION
370 M = 0: REM  BECOMES A 1 WHEN
     CARRYING MAGIC CARPET
380 B = 200: REM  BATTERY POWER
     LEFT
390 D = 0: REM  BECOMES A 1 AFTE
     R INVISIBLE DOG FOUND
400  VTAB 4
410  PRINT "     WELCOME TO THE M
     ARPLE CAVES WHERE  YOU'LL FI
     ND MYSTERY, TREASURE AND
          A D V E N T U R E."
420  PRINT
430  GOTO 500
440  REM
450  REM          MAIN ROUTINE
                 -------------
460  REM
470  HOME
480 B = B - 1
490  IF B = 0 THEN 3740
500  IF W = 0 THEN 3140
510  REM
520  REM      !!!!! CHANCE SITUATI
     ONS !!!!!
530  REM
540  IF  FN R(200) = 200 THEN  GOSUB
     1890
550  IF  FN R(200) = 200 THEN  GOSUB
     2120
560  IF (D = 0) * (A(W) = 0) * ( FN
     R(50) = 50) THEN  GOSUB 2580
570  IF (A(W) = 6) * ( FN R(5) =
     5) THEN 3570
```



➔

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AUTHORISED DEALER

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LE STICK

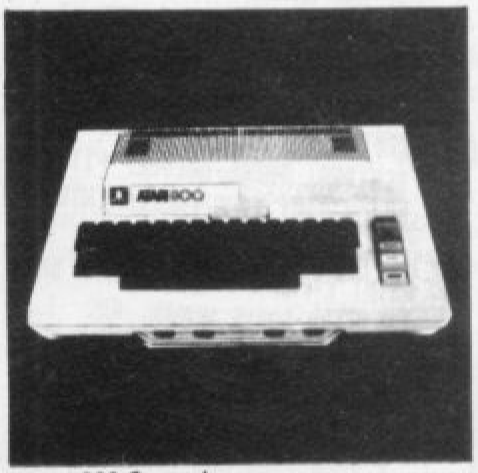
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Everything in "Look at what you get" list.

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12½ x 8in. drawing board. Drawing on board is reproduced on TV via Atari with 32K RAM and Disk Drive. Closed areas may be filled in with one of 3 colours. Text may be added in any one of 4 fonts. Paint brush mode: select size of brush and paint away. Air brush mode: shade in your drawing - colour and density is up to you. Plus many more features. S.a.e. for price and further details.

MAPLIN

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Note: Order codes shown in brackets. All prices include VAT and shipment by Data Post.

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Tel: (0702) 554000 and at
159-161 King St., Hammersmith W6.
Tel: 01-748 0926

TREASURE HUNT




```
580 IF (M = 1) $ ( FN R(5) = 5) THEN GOSUB 2720
590 REM
600 REM !!!!! SEE IF SPECIAL SITUATION !!!!!
610 REM
620 IF A(W) = 2 THEN 3440
630 IF A(W) = 4 THEN 2890
640 IF A(W) = 5 THEN GOSUB 1770
650 IF A(W) = 7 THEN PRINT : PRINT : PRINT "THERE'S A SHY LITTLE ELF IN HERE HIDING SOMETHING."
660 IF A(W) = 8 THEN 2410
670 REM
680 REM !!!!! WHERE YOU CAN GO NEXT !!!!!
690 REM
700 GOSUB 3350
710 Z = W
720 GOSUB 4120
730 FOR N = 134 TO 136
740 IF A(N) < 0 THEN 780
750 PRINT TAB( 5);"CAVE "A(N);
760 IF A(N) = 0 THEN PRINT "- THE ENTRANCE";
770 PRINT
780 NEXT
790 REM
800 REM !!!!! QUIT & BATTERY TEST !!!!!
810 REM
820 IF B > 190 THEN 880
830 IF W < > 0 THEN 880
840 INPUT "TO EXPLORE SOME MORE TYPE 1, ELSE TYPE 2";J$
850 J = VAL (J$)
860 IF J = 2 THEN 3810
870 IF J < > 1 THEN 840
880 IF B = 50 THEN PRINT : PRINT " I HOPE YOU BROUGHT MORE FLASHLIGHT BATTERIES."
890 IF B = 25 THEN PRINT : PRINT " YOUR FLASHLIGHT IS STARTING TO DIM A LITTLE."
900 IF B = 8 THEN PRINT : PRINT " YOUR FLASHLIGHT IS ALMOST OUT. BETTER LEAVE RIGHT NOW!!!"
910 IF A(W) = 3 THEN GOSUB 2290
920 REM
930 REM !!!!! ADJACENT CAVE'S CONTENTS !!!!!
940 REM
950 K = 0
960 L = 0
970 FOR N = 134 TO 136
980 J = A(N)
990 IF J < 0 THEN 1090
1000 IF A(J) = 5 THEN 1090
1010 IF (A(J) > 0) $ (A(J) < 10) $ (K = 0) THEN PRINT :K = 1
1020 IF (A(J) = 2) $ (L = 0) THEN PRINT " THERE ARE PITS NEARBY. WATCH YOUR STEP.":L = 1
1030 IF A(J) = 3 THEN PRINT " CAREFUL. THERE'S A PIRATE NEARBY."
1040 IF A(J) = 4 THEN PRINT " I HEAR A HUNGRY DRAGON WAITING FOR HIS SUPPER."
1050 IF A(J) = 6 THEN PRINT " THERE'S A SIGN HERE THAT SAYS : >>> D A N G E R <<<"
1060 IF A(J) = 7 THEN PRINT " SOUNDS LIKE SOMEBODY IS SINGING. MUST BE AN ELF."
1070 IF A(J) = 8 THEN PRINT " THERE'S A STRANGE MIST IN HERE."
1080 IF A(J) = 9 THEN PRINT CHR$ (34)"RUFF RUFF" CHR$ (34)" I HEAR A DOG BARKING."
1090 NEXT
1100 IF A(131) = 0 THEN 1200
1110 PRINT
1120 PRINT "YOU'RE CARRYING :"
1130 FOR N = 131 TO 133
1140 IF A(N) < 100 THEN 1180
1150 Z = A(N)
1160 GOSUB 4040
1170 PRINT A$,
1180 NEXT
1190 PRINT
1200 IF A(W) < 100 THEN PRINT : GOTO 1440
1210 REM
1220 REM !!!!! TREASURE IN THIS CAVE !!!!!
1230 REM
1240 PRINT
1250 Z = A(W)
1260 GOSUB 4040
1270 PRINT " THIS CAVE HAS " A$" IN IT."
1280 PRINT "DO YOU WANT TO TAKE IT WITH YOU ?"
1290 INPUT "(Y OR N) ";J$
1300 IF J$ = "N" THEN 1440
1310 IF J$ < > "Y" THEN 1290
1320 IF Z = 290 THEN GOSUB 1630
1330 IF Z = 290 THEN 1440
1340 IF Z = 291 THEN M = 1
1350 IF Z = 294 THEN GOSUB 1990
1360 IF Z = 1 THEN 1440
1370 IF Z = 295 THEN 3650
1380 FOR N = 131 TO 133
1390 IF A(N) = 0 THEN A(N) = A(W):A(W) = 0: GOTO 1430
1400 NEXT
1410 PRINT " YOU CAN'T PICK IT UP NOW. YOU'RE CARRYING TOO MUCH."
1420 GOTO 1440
1430 PRINT "O.K. YOU'VE GOT "A$"."
1440 IF A(W) = 7 THEN A(W) = 307
1450 REM
1460 REM !!!!! WHERE TO NEXT !!!!!
1470 REM
1480 INPUT " WHAT CAVE DO YOU WANT TO EXPLORE NEXT ? ";J
1490 FOR N = 134 TO 136
1500 IF A(N) = - 1 THEN 1520
1510 IF J = A(N) THEN W = J: GOTO 470
1520 NEXT
1530 IF (M = 1) $ (J > = 0) $ (J < = 94) $ ( INT (J) = J) THEN W = J: GOTO 470
1540 PRINT " SORRY, BUT YOU CAN'T GO THERE FROM HERE."
1550 GOTO 1480
1560 REM
1570 REM
1580 REM SPECIAL SITUATION SUBROUTINES
1590 REM -----------------------------
1600 REM
1610 REM !!!!! LOCK BOX !!!!!
1620 REM
1630 FOR N = 131 TO 133
1640 IF A(N) = 289 THEN 1680
1650 NEXT
1660 PRINT "YOU CAN'T TAKE IT. IT'S TOO HEAVY."
1670 RETURN
1680 PRINT " THE BOX WAS TOO HEAVY SO I OPENED IT WITH YOUR KEYS. BY THE WAY, THERE ISA RUBY IN IT THAT YOU CAN TAKE."
1690 A(W) = 308
1700 Z = 308
1710 GOSUB 4040
1720 RETURN
1730 REM
1740 REM !!!!! VENDING MACHINE !!!!!
1750 REM
1760 VTAB 4
```

TREASURE HUNT

```
1770  PRINT "THERE'S A VENDING MA
    CHINE HERE."
1780  FOR N = 131 TO 133
1790  IF A(N) = 288 THEN 1820
1800  NEXT
1810  RETURN
1820  PRINT "      I'LL GET SOME B
    ATTERIES WITH ONE OFYOUR GOL
    D COINS."
1830 B = 200
1840 A(W) = 0
1850  RETURN
1860  REM
1870  REM     ::::: EARTHQUAKE ::
    :::
1880  REM
1890  FOR N = 1 TO 10
1900 Z = 3 +  FN R(88)
1910  GOSUB 3950
1920  NEXT
1930  VTAB 6
1940  PRINT "      GUESS WHAT ?  W
    E JUST HAD AN EARTH-QUAKE.
    BUT I'M O.K.."
1950  RETURN
1960  REM
1970  REM     ::::: MAGIC WAND RO
    UTINE :::::
1980  REM
1990  FOR N = 131 TO 133
2000  IF A(N) = 293 THEN 2040
2010  NEXT
2020  PRINT "      IT'S STUCK IN T
    HE ROCKS AND CAN'T  BE PULLE
    D OUT."
2030 Z = 1: RETURN
2040  PRINT "      LET ME USE YOUR
     MAGIC WAND A SEC. ";
2050  FOR Z = 0 TO 2000: NEXT
2060  PRINT : PRINT "HOCUS, POCUS
    ..."
2070  FOR Z = 0 TO 2000: NEXT
2080 A(W) = 310:Z = 0
2090  RETURN
2100  REM
2110  REM     ::::: BATS SHOW UP
    :::::
2120  VTAB 6: PRINT ""
2130  PRINT "      A SUPER BAT JUS
    T FLEW INTO THE CAVEAND PICK
    ED YOU UP."
2140  IF A(131) <  > 0 THEN  PRINT
     "YOU DROPPED ALL OF  YOUR TR
    EASURES."
2150  FOR N = 131 TO 133
2160  IF A(N) = 0 THEN 2180
2170 A(0) = A(N):A(N) = 0:Z = 0: GOSUB
     3950
2180  NEXT
2190 N =  FN R(94)
2200  IF A(N) <  > 0 THEN 2190
2210 W = N
2220  PRINT "      THE BAT JUST DR
    OPPED YOU INTO CAVE "W" !!!"
2230  PRINT "      IF YOU'RE ALRIG
    HT HIT " CHR$ (34)"RETURN" CHR$
    (34);: CALL  - 756
2240  HOME
2250  RETURN
2260  REM
2270  REM     ::::: PIRATE HERE :
    ::::
2280  REM
2290  PRINT : PRINT "      THERE W
    AS A PIRATE IN HERE."
2300  IF A(131) <  > 0 THEN  PRINT
    "      HE JUST STOLE ALL YOUR
    TREASURES !"
2310  FOR N = 131 TO 133
2320 A(N) = 0
2330  NEXT
2340 Z = W
2350  GOSUB 3950
2360  PRINT "      HE'S GONE NOW."
2370  RETURN
2380  REM     ::::: MAGICIAN ROUT
    INE :::::
2390  REM
2400  HOME
2410  VTAB 6: PRINT ""
2420  PRINT "      THERE'S A MAGIC
    IAN IN THIS CAVE.  HE SAYS
    HE LOST HIS MAGIC BOOK.  HE
    SAYSHE'D GIVE YOU A GOLDEN H
    ARP IF YOU'LL  TELL HIM WHE
    RE IT IS.  TYPE IN THE CAVE
    NUMBER.  IF YOU DON'T KNOW,
    THEN JUST "
2430  PRINT "TYPE " CHR$ (34)"99"
     CHR$ (34)"."
2440  PRINT
2450  INPUT "WHERE'S HIS MAGIC BO
    OK ? ";J$
2460 J =  INT ( VAL (J$))
2470  IF (J < 0) + (J > 95) THEN
    2520
2480  IF A(J) <  > 295 THEN 3840
2490 A(W) = 309
2500 A(J) = 0
2510  GOTO 470
2520 Z = W
2530  GOSUB 3950
2540  GOTO 470
2550  REM
2560  REM     ::::: INVISIBLE MAN
     ROUTINE :::::
2570  REM
2580  VTAB 6: PRINT ""
2590  PRINT "      THE INVISIBLE M
    AN IS HERE LOOKING  FOR HIS
    INVISIBLE DOG.  HE SAYS HE'L
    L  GIVE YOU A $1000 REWARD
    IF YOU CAN TELL HIM WHERE HI
    S DOG IS.  IF YOU DON'T KNOW
    THEN GUESS."
2600  PRINT
2610  INPUT "WHAT CAVE IS THE INV
    ISIBLE DOG IN ? ";J$
2620  HOME
2630 J =  INT ( VAL (J$))
2640  IF (J < 0) + (J > 95) + ( INT
    (J) <  > J) + (A(J) <  > 9) THEN
     RETURN
2650 A(W) = 305
2660 A(J) = 0
2670 D = 1
2680  RETURN
2690  REM
2700  REM     ::::: MAGIC CARPET
    DISAPPEARS :::::
2710  REM
2720  FOR N = 131 TO 133
2730  IF A(N) = 291 THEN 2770
2740  NEXT
2750 M = 0
2760  RETURN
2770 A(N) = 0
2780  IF N = 133 THEN 2830
2790  FOR J = N TO 132
2800 A(J) = A(J + 1)
2810 A(J + 1) = 0
2820  NEXT
2830  PRINT "      POOF !!!     YO
    UR MAGIC CARPET JUSTDISAPPEA
    RED."
2840 M = 0
2850  RETURN
2860  REM
2870  REM     ::::: DRAGON ROUTIN
    E :::::
2880  REM
2890  FOR N = 131 TO 133
2900  IF A(N) = 292 THEN 2930
2910  NEXT
2920  GOTO 3500
2930  VTAB 6
2940  PRINT "YIKES !!!!  THERE'S
    A DRAGON IN HERE."
2950  PRINT "GIVE ME YOUR GUN, QU
    ICK !!!"
2960  FOR N = 0 TO 2000: NEXT
2970  HOME
2980  FOR N = 1 TO 5
2990  VTAB  FN R(23): HTAB  FN R(
    25): PRINT "B A N G ! ! !"
3000  FOR J = 0 TO 500: NEXT : HOME

3010  NEXT
3020  PRINT  TAB(  FN R(30));"POO
    F !!!"
3030  FOR J = 0 TO 500: NEXT : HOME
3040  PRINT "      INCREDIBLE ???
    THE DRAGON JUST    VANISHED
    WHEN I SHOT HIM RIGHT BETWE
    EN  THE EYES."
3050  PRINT : PRINT "      BUT LOO
    K AT THIS.  HE LEFT BEHIND
    HIS LITTLE BLACK BOOK WITH T
    HE ADDRESS  AND PHONE NUMBER
    S OF EVERY BEAUTIFUL    PRIN
    CESS IN PENNSYLVANIA."
```

Acorn Atom CHESS



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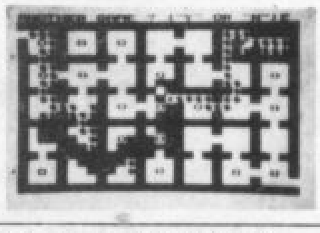
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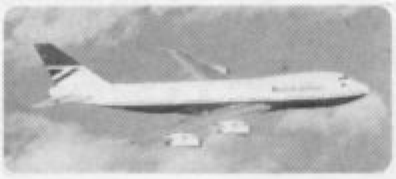
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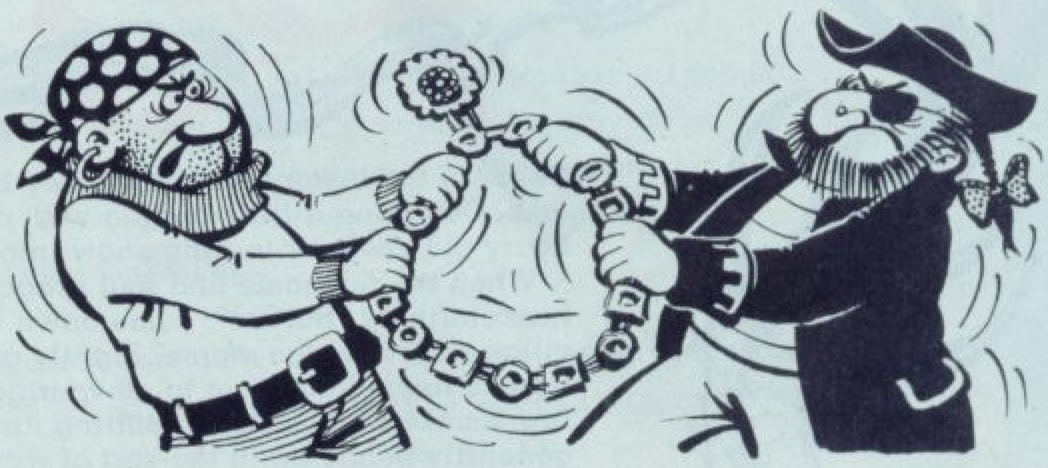
TREASURE HUNT




```
3060  PRINT
3070  PRINT "     HIT THE " CHR$
   (34)"RETURN" CHR$ (34)" KEY
   WHEN YOU CATCHYOUR BREATH.";
   : CALL  - 756
3080 A(W) = 306
3090 B = B + 1
3100  GOTO 470
3110  REM
3120  REM   ::::: AT ENTRANCE R
   OUTINE :::::
3130  REM
3140  IF A(131) = 0 THEN 3210
3150  FOR N = 131 TO 133
3160  IF A(N) = 0 THEN 3200
3170 J = 96
3180  IF A(J) <  > 0 THEN J = J +
   1: GOTO 3180
3190 A(J) = A(N)
3200  NEXT
3210  IF A(96) = 0 THEN 3270
3220  PRINT "    SO FAR, YOU'VE F
   OUND THESE TREASURESIN THE C
   AVES :"
3230  FOR N = 96 TO 130
3240  IF A(N) = 0 THEN 3270
3250 Z = A(N): GOSUB 4040: PRINT
   A$", ";: IF  PEEK (36) > 28 THEN
   PRINT
3260  NEXT
3270  FOR N = 131 TO 133:A(N) = 0
   : NEXT
3280  PRINT : PRINT
3290  PRINT : PRINT "      YOU'RE
   AT A CAVE ENTRANCE THAT
   LEADS TO :"
3300 B = B + 1
3310  GOTO 710
3320  REM
3330  REM     ::::: IN ROUTINE ::
   :::
3340  REM
3350  PRINT : PRINT : PRINT "
   YOU'RE IN CAVE "W" WHICH LE
   ADS TO :"
3360  RETURN
3370  REM
3380  REM
3390  REM         END OF PROGRAM RO
   UTINES
3400  REM     -------------------
   --------
3410  REM
3420  REM     ::::: FELL INTO A P
   IT :::::
3430  REM
3440  VTAB 6: PRINT "": PRINT "
     SORRY, BUT I TRIED TO WAR
   N YOU."
3450  PRINT "YOU FELL INTO A DEEP
   PIT AND KILLED     YOURSELF
   !!!"
3460  END
3470  REM
3480  REM     ::::: EATEN BY THE
   DRAGON :::::
3490  REM
3500  VTAB 6: PRINT ""
3510  PRINT "      SORRY, BUT I TR
   IED TO TELL YOU      ABOUT TH
   AT SOUND.  SUPPER IS NOW BEI
   NG  SERVED HERE IN THE DRAGO
   N'S CHAMBER..."
3520  PRINT : PRINT : FOR I = 1 TO
   500: NEXT : INVERSE : PRINT
   "AND YOU ARE THE SUPPER !!!"
   : NORMAL
3530  END
3540  REM
3550  REM     ::::: ROOF FELL IN
   :::::
3560  REM
3570 VTA6: PRINT ""
3580  PRINT "      THE ROOF JUST F
   ELL IN AND BURIED   YOU ALIV
   E.  TOO BAD I DON'T HAVE A
        SHOVEL OR I'D DIG YOU OU
   T."
3590  PRINT
3600  PRINT "SEE YAH LATER."
3610  END
3620  REM
3630  REM     ::::: PICKED UP MAG
   IC BOOK :::::
3640  REM
3650  HOME
3660  VTAB 6: PRINT ""
3670  PRINT "      I DON'T THINK Y
   OU SHOULD HAVE DONE THAT.  T
   HE MAGICIAN WHO OWNS THAT MA
   GIC BOOK PUT A SPELL ON IT.
   ANYBODY THAT   TRIES TO PIC
   K IT UP TURNS INTO A FROG."
3680  PRINT
3690  PRINT "EXCUSE ME WHILE I LO
   OK FOR SOME FLIES."
3700  END
3710  REM
3720  REM     ::::: BATTERIES WEN
   T DEAD :::::
3730  REM
3740  VTAB 6: PRINT ""
3750  PRINT "      NOW LOOK WHAT Y
   OU DID.  YOUR FLASH-LIGHT WE
   NT OUT AND YOU FELL INTO A P
   IT  AND KILLED YOURSELF.  TO
   O BAD.          ESPECIALLY A
   FTER YOU WERE DOING SO WELL.
   "
3760  END
3770  REM
3780  REM     ::::: USER QUITS ::
   :::
3790  REM
3800  VTA6
3810  PRINT "      THE TREASURES A
   RE YOURS TO KEEP.   GOOD LUC
   K !!!"
3820  END
3830  REM     ::::: MAGICIAN UPSE
   T :::::
3840  VTAB 6
3850  PRINT "      YOU'VE MADE THE
   MAGICIAN VERY ANGRY.CAVE "J
   " DOESN'T HAVE A MAGIC BOOK
   IN IT."
3860  FLASH : PRINT "TO PUNISH YO
   U, THE MAGICIAN CASTS A
   SPELL ON YOU AND NOW YOU'RE
   ONLY TWO     INCHES TALL.";: NORMAL
3870  PRINT "      WORSE YET, THE
   MAGICIAN PUT YOU     INTO A S
   MALL JAR.  IF YOU EVER GET O
   UT  OF THIS MESS, LET ME KNO
   W."
3880  END
3890  REM
3900  REM         UTILITY SUBROUTIN
   ES
3910  REM     -------------------
   ----
3920  REM
3930  REM     ::::: MOVE ITEM TO
   NEW CAVE LOCATION :::::
```

```
3940 REM
3950 Y = 3 + FN R(88)
3960 IF A(Y) < > 0 THEN 3950
3970 IF (Y = W) + (Y = Z) THEN 3950
3980 A(Y) = A(Z)
3990 A(Z) = 0
4000 RETURN
4010 REM
4020 REM     ::::: MAKE A$ NAME OF TREASURE :::::
4030 REM
4040 RESTORE
4050 FOR X = 0 TO Z - 288
4060 READ A$
4070 NEXT
4080 RETURN
4090 REM
4100 REM     :::::SET UP CONNECTING CAVE NUMBERS :::::
4110 REM
4120 FOR X = 0 TO 2
4130 A(134 + X) = A(137 + X + (Z * 3))
4140 NEXT
4150 RETURN
4160 REM
4170 REM
4180 REM       TREASURE LIST
4190 REM     -----------------
9910 DATA "GOLD COINS
9911 DATA "SOME KEYS
9912 DATA "A LOCK BOX
9913 DATA "A MAGIC CARPET
9914 DATA "AN OLD GUN
9915 DATA "A MAGIC WAND"
9916 DATA "A SWORD"
9917 DATA "A MAGIC BOOK
9918 DATA "AN OLD CLOCK
9919 DATA "FURS
9920 DATA "A SILVER BELL
9921 DATA "A NECKLACE
9922 DATA "A PEARL
9923 DATA "A DIAMOND
9924 DATA "A GOLD WATCH
9925 DATA "AN EMERALD
9926 DATA "JEWELRY
9927 DATA "A $1000 BILL
9928 DATA "A BLACK BOOK
9929 DATA "SOME ELF FOOD"
9930 DATA "A RUBY
9931 DATA "A GOLDEN HARP
9932 DATA "A SWORD
9997 REM
9998 REM        DATA FOR CONNECTING CAVES
9999 REM     ------------------------------
10000 DATA   1,94,-1

10001 DATA 0,2,3
10002 DATA 1,4,5
10003 DATA 1,6,7
10004 DATA 2,8,9
10005 DATA 2,10,11
10006 DATA 3,12,13
10007 DATA 3,14,15
10008 DATA 4,16,17
10009 DATA 4,18,19
10010 DATA 5,20,21
10011 DATA 5,22,23
10012 DATA 6,24,25
10013 DATA 6,26,27
10014 DATA 7,28,29
10015 DATA 7,30,31
10016 DATA 8,32,33
10017 DATA 8,34,35
10018 DATA 9,36,37
10019 DATA 9,38,39
10020 DATA 10,40,41
10021 DATA 10,42,43
10022 DATA 11,44,45
10023 DATA 11,46,47
10024 DATA 12,48,49
10025 DATA 12,50,51
10026 DATA 13,52,53
10027 DATA 13,54,55
10028 DATA 14,56,57
10029 DATA 14,58,59
10030 DATA 15,60,61
10031 DATA 15,62,63
10032 DATA 16,63,64
10033 DATA 16,34,64
10034 DATA 17,33,65
10035 DATA 17,36,65
10036 DATA 18,35,66
10037 DATA 18,38,66
10038 DATA 19,37,67
10039 DATA 19,40,67
10040 DATA 20,39,68
10041 DATA 20,42,68
10042 DATA 21,41,69
10043 DATA 21,44,69
10044 DATA 22,43,70
10045 DATA 22,46,70
10046 DATA 23,45,71
10047 DATA 23,48,71
10048 DATA 24,47,72
10049 DATA 24,50,72
10050 DATA 25,49,73
10051 DATA 25,52,73
10052 DATA 26,51,74
10053 DATA 26,54,74
10054 DATA 27,53,75
10055 DATA 27,56,75
10056 DATA 28,55,76
10057 DATA 28,58,76
10058 DATA 29,57,77
10059 DATA 29,60,77
10060 DATA 30,59,78
10061 DATA 30,62,78
10062 DATA 31,61,79
10063 DATA 31,32,79
10064 DATA 32,33,80
10065 DATA 34,35,80
10066 DATA 36,37,81
10067 DATA 38,39,81
10068 DATA 40,41,82
10069 DATA 42,43,82
10070 DATA 44,45,83
10071 DATA 46,47,83
10072 DATA 48,49,84
10073 DATA 50,51,84
10074 DATA 52,53,85
10075 DATA 54,55,85
10076 DATA 56,57,86
```



```
10077 DATA 58,59,86
10078 DATA 60,61,87
10079 DATA 62,63,87
10080 DATA 64,65,88
10081 DATA 66,67,88
10082 DATA 68,69,89
10083 DATA 70,71,89
10084 DATA 72,73,90
10085 DATA 74,75,90
10086 DATA 76,77,91
10087 DATA 78,79,91
10088 DATA 80,81,92
10089 DATA 82,83,92
10090 DATA 84,85,93
10091 DATA 86,87,93
10092 DATA 88,89,94
10093 DATA 90,91,94
10094 DATA  0,92,93
65000 REM *** TREASURE HUNT
65000 REM *** BY LANCE MICKLUS
65000 REM *** TRANSLATED FOR
65000 REM *** APPLE ][

65000 REM *** BY
65000 REM *** MURRAY R. SUMMERS

65000 REM *** SPRINGFIELD, PA
```

TREASURE HUNT

RUNS ON A 40 COLUMN PET IN 8K

DRAGON DRUGGIN

BY PAUL JAY



Never in the history of Necromancy had there been such a task. Defeating a fiery dragon with nothing more than a hoary old spell for turning snow into sleeping tablets.

When the fearsome and foul dragon, who we shall refer to henceforth as "Horace", came down from the mountains, the villagers feared the worse. Rightly as it turned out. For Horace immediately set to, devouring maidens, breathing fire, smoke and halitosis, putting up mortgage rates and generally behaving in the sort of way that would give football supporters a good name.

All this action occurs off-screen and I did not program any of it into the game . . . be thankful for small mercies!

Horace's anti-social behaviour is a problem which cannot be tolerated, so the local wizard was called for and appraised of the situation and the need for urgent action.

Wizards have often appeared in adventure-type games but none ever had to work under the same restrictions as our hero, Butch.

All through wizard school, Butch would misbehave, preferring to smoke behind the apothecary labs than learn his frog-turning tables.

So Butch left wizard school with only a C.S.E. pass in Magic Sleeping Pill from Snow transmuting — generally considered a soft subject.

Butch can only manage five pills anyway. They appear in the sky at the top of the screen and fall rapidly to the ground. You can direct them into Horace's mouth by pressing "space". Three is enough to put even a dragon to sleep.

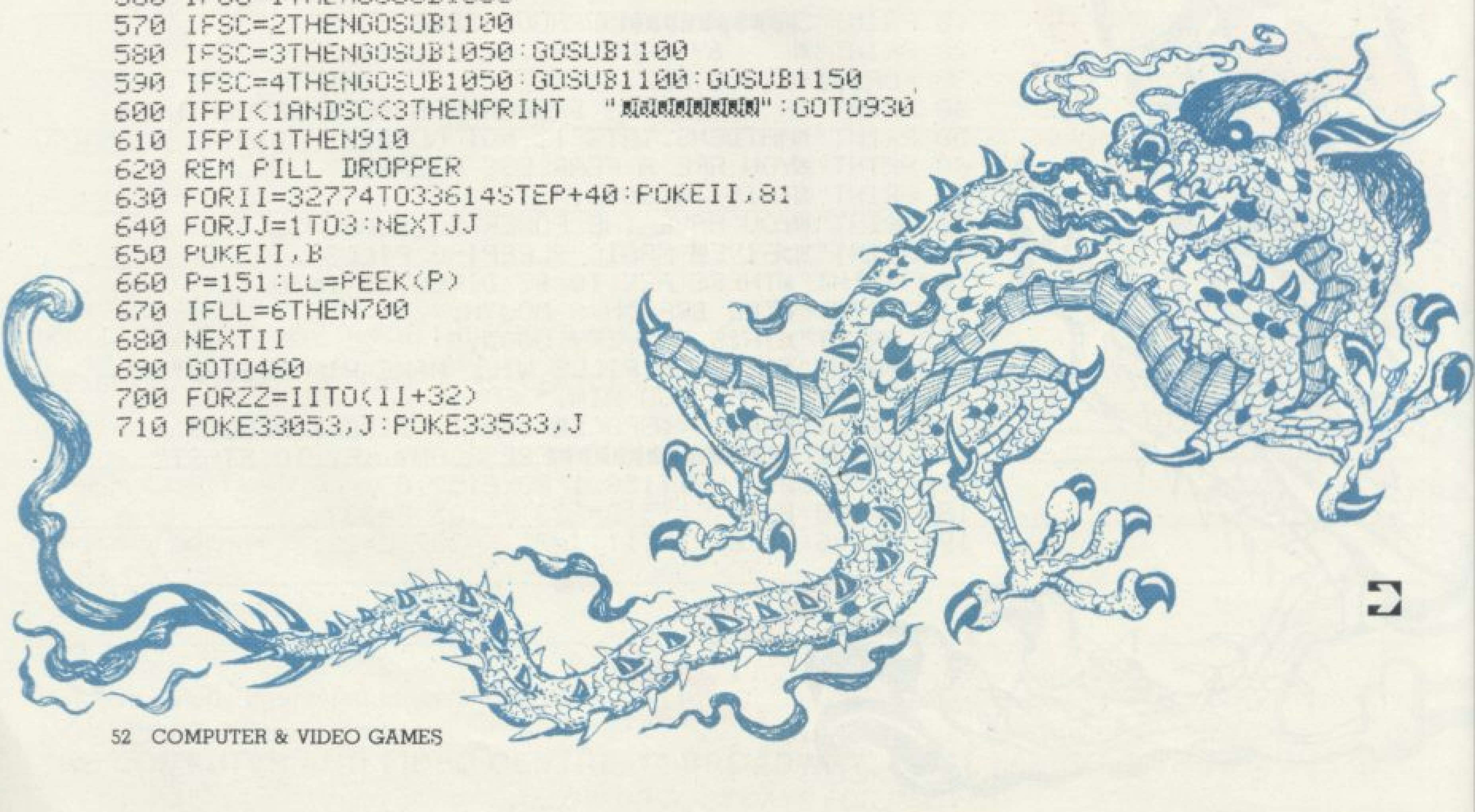
If less than three pills enter Horace's mouth, he will respond by burning Butch's head off — a violent game perhaps, but then life's like that sometimes.



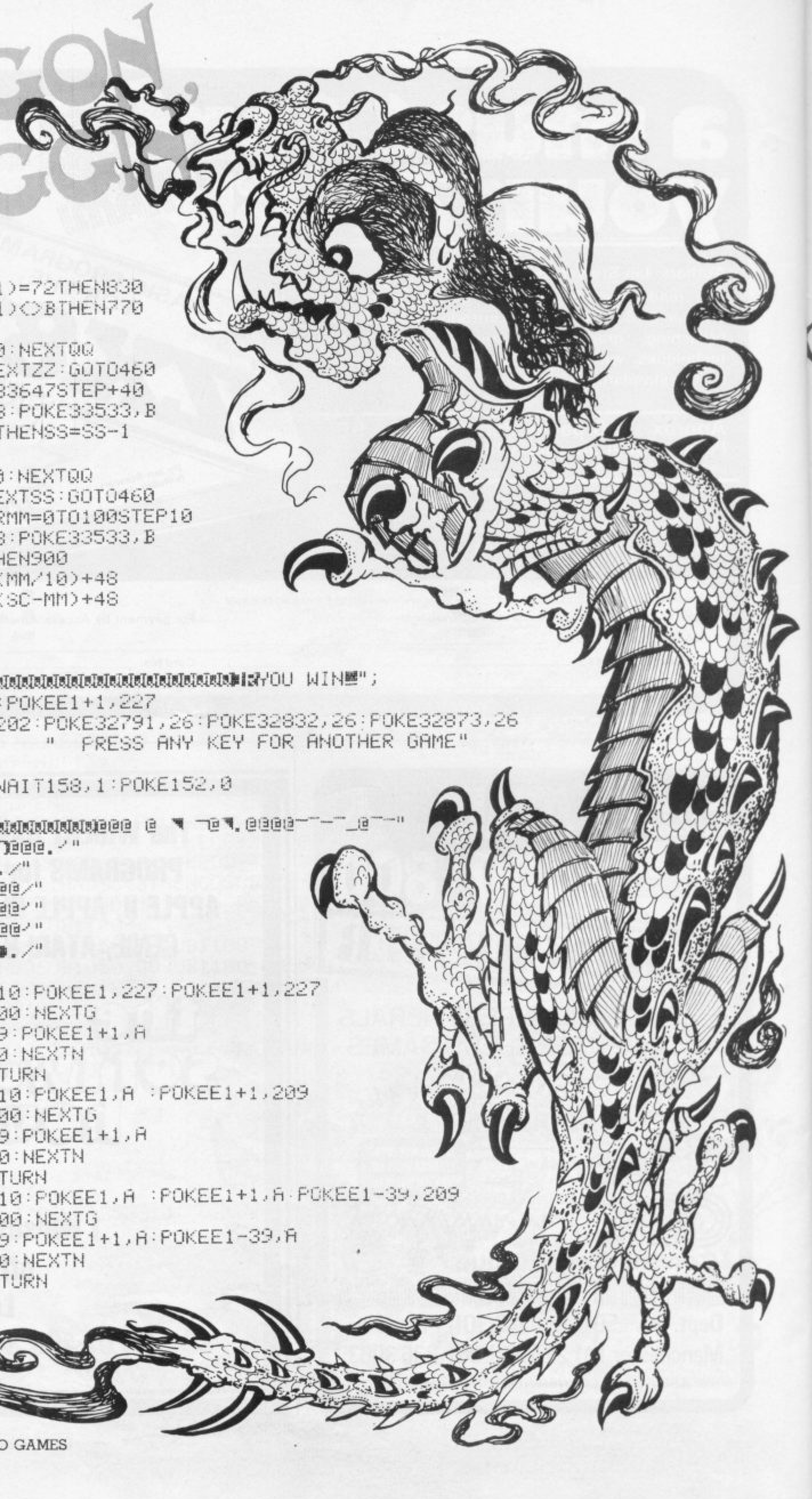
```
10 PRINT"DRAGON DRUGGIN'"
20 PRINT"     BY PAUL JAY. 13.6.81"
30 FORI=1TO2000:NEXT
40 PRINT"A FEROCIOUS DRAGON HAS BEEN DEVOURING "
50 PRINT"MAIDENS.THIS IS NOT GOOD."
60 PRINT"YOU ARE A FEARLESS WIZARD."
70 PRINT"THIS IS GOOD."
80 PRINT"YOU HAVE THE POWER TO SUMMON"
90 PRINT"FIVE MAGIC SLEEPING PILLS"
100 PRINT"THESE ARE TO BE DIRECTED INTO."
110 PRINT"THE DRAGON'S MOUTH."
120 PRINT"THIS IS VERY GOOD."
130 PRINT"THREE PILLS WILL MAKE HIM SLEEP."
140 PRINT"THEN YOU WIN."
150 PRINT"PRESS SPACE BAR TO DIRECT PILL."
160 PRINT"PRESS ANY KEY TO START"
170 POKE152,0:WAIT158,1:POKE152,0
180 A=160:B=32:C=95:D=223:E=105:F=233
190 G=206:H=205:I=111:J=72:K=207:L=231
```

DRAGON DRUGGIN'

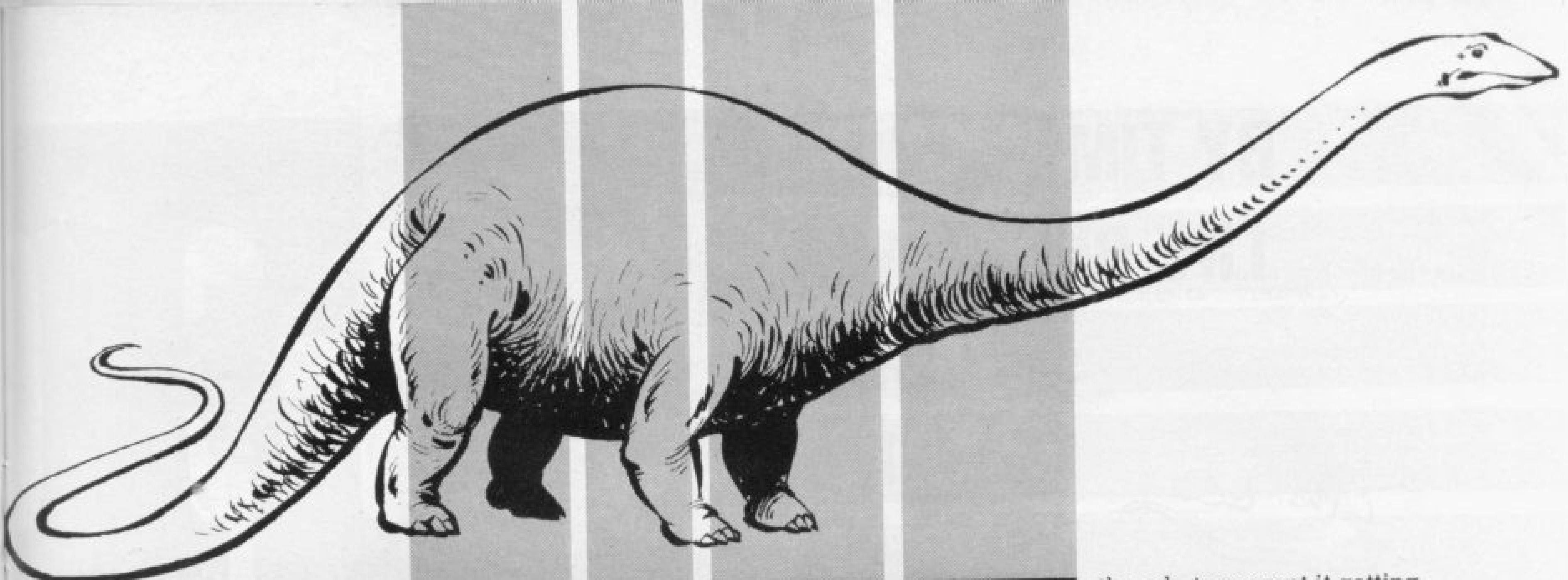
```
200 AA=33191:BB=33231:CC=33271:DD=33311:EE=33354:FF=33394:PI=6:SC=0
210 E1=33033
220 PRINT"
230 PRINT"                    |                "
240 PRINT"                    |                "
250 PRINT"                                     "
260 PRINT"                                     "
270 PRINT"                                     "
280 PRINT"                    *                "
290 PRINT"                                     "
300 PRINT"  *                                  "
310 PRINT"                                     "
320 PRINT"  /.   |                             "
330 PRINT"       |            |                "
340 PRINT"                                     "
350 PRINT"     /                               "
360 PRINT"   //                                "
370 PRINT"                                     "
380 PRINT"     *                               "
390 PRINT"                                     "
400 PRINT"  *                                  "
410 PRINT"                                     "
420 PRINT"   *                                 "
430 PRINT"     *                               "
440 PRINT"_____________________________________"
450 REM MOUTH CLOSED
460 POKEAA,H:POKEAA+1,H:POKEAA+2,H:POKEBB,C:POKEBB+1,A:POKEBB+2,L:POKECC,B
470 POKECC+1,B:POKECC+2,B:POKECC+3,I:POKECC+4,I:POKEDD,B:POKEDD+1,B
480 POKEDD+2,B:POKEDD+3,A:POKEDD+4,A:POKEEE,A:POKEEE+1,A:POKEFF,A
490 M=INT(2000*RND(1))
500 FORV=1TOM:NEXT
510 REM MOUTH OPEN
520 POKEAA,C:POKEAA+1,B:POKEAA+2,C:POKEBB,B:POKEBB+1,B:POKEBB+2,J:POKECC,D
530 POKECC+1,D:POKECC+2,F:POKECC+3,A:POKECC+4,L:POKEDD,C:POKEDD+1,A
540 POKEDD+2,A:POKEDD+3,A:POKEDD+4,E:POKEEE,B:POKEEE+1,F:POKEFF,F
550 PI=PI-1:IFPI<1ANDSC<3THENGOSUB970
560 IFSC=1THENGOSUB1050
570 IFSC=2THENGOSUB1100
580 IFSC=3THENGOSUB1050:GOSUB1100
590 IFSC=4THENGOSUB1050:GOSUB1100:GOSUB1150
600 IFPI<1ANDSC<3THENPRINT  "":GOTO930
610 IFPI<1THEN910
620 REM PILL DROPPER
630 FORII=32774TO33614STEP+40:POKEII,81
640 FORJJ=1TO3:NEXTJJ
650 POKEII,B
660 P=151:LL=PEEK(P)
670 IFLL=6THEN700
680 NEXTII
690 GOTO460
700 FORZZ=IITO(II+32)
710 POKE33053,J:POKE33533,J
```



DRAGON DRUGON



```
720 IFPEEK(ZZ+1)=72THEN830
730 IFPEEK(ZZ+1)<>BTHEN770
740 POKEZZ,81
750 FORQQ=1TO50:NEXTQQ
760 POKEZZ,B:NEXTZZ:GOTO460
770 FORSS=ZZTO33647STEP+40
780 POKE33053,B:POKE33533,B
790 IFSS+40<>BTHENSS=SS-1
800 POKESS,81
810 FORQQ=1TO50:NEXTQQ
820 POKESS,B:NEXTSS:GOTO460
830 SC=SC+1:FORMM=0TO100STEP10
840 POKE33053,B:POKE33533,B
850 IFSC-MM>9THEN900
860 POKE33747,(MM/10)+48
870 POKE33748,(SC-MM)+48
880 POKEI,B
890 GOTO460
900 NEXTMM
910 PRINT"[illegible]YOU WIN[illegible]";
920 POKEE1,227:POKEE1+1,227
925 POKE33210,202:POKE32791,26:POKE32832,26:POKE32873,26
930 PRINT             "  PRESS ANY KEY FOR ANOTHER GAME"
940 POKE158,0
950 POKE152,0:WAIT158,1:POKE152,0
960 GOTO180
970 PRINT"[illegible]@@@ @ ▼ ¬@▼.@@@@¯¯-¯_@¯-"
980 PRINT"TTTT@@@./"
990 PRINT"\@@@./"
1000 PRINT"\@@@@/"
1010 PRINT" \@@@@/"
1020 PRINT"\@@@@/"
1030 PRINT" \■@●./"
1040 RETURN
1050 FORYY=1TO10:POKEE1,227:POKEE1+1,227
1060 FORG=1TO100:NEXTG
1070 POKEE1,209:POKEE1+1,A
1080 FORN=1TO30:NEXTN
1090 NEXTYY:RETURN
1100 FORYY=1TO10:POKEE1,A :POKEE1+1,209
1110 FORG=1TO100:NEXTG
1120 POKEE1,209:POKEE1+1,A
1130 FORN=1TO30:NEXTN
1140 NEXTYY:RETURN
1150 FORYY=1TO10:POKEE1,A :POKEE1+1,A:POKEE1-39,209
1160 FORG=1TO100:NEXTG
1170 POKEE1,209:POKEE1+1,A:POKEE1-39,A
1180 FORN=1TO30:NEXTN
1190 NEXTYY:RETURN
```



LIFE

David Attenborough captured some of the excitement of the story of Life in his recent T.V. series, now it is possible to capture the rest on an Acorn Atom.

Life is the popular computer cell generation game which was first invented by Cambridge mathematician John Horton Conway. A cell pattern is plotted on the computer screen and when the program is run, three simple rules which the cells have to adhere to, come into operation.

The rules of Life are: Birth, Survival and finally Death.

Birth — if an optimum number of cells (3) surround an empty cell it will be brought to life on the next generation.

Survival — if a cell has either two or three neighbours it will remain alive in the next generation.

Death — if a cell has less than two living neighbours then it will die of loneliness, more than three and it will die of overcrowding.

So after each generation the screen changes, with some cells giving birth to others, some merely living on and some dying out.

There is a limit to this computerised version of Life though, to prevent it getting out of hand, all the action takes place within four borders. A cell is considered to be neighbours with another if the two share a common border or corner — so diagonal neighbours count as well.

Then the laws of Life are applied simultaneously with every square on the board being checked. This is a task ideally suited to a computer and the excitement comes from plotting in an original pattern to produce the most exciting action. It has all helped to turn Life into a computer game classic.

THE GAME OF CELLULAR EVOLVEMENT

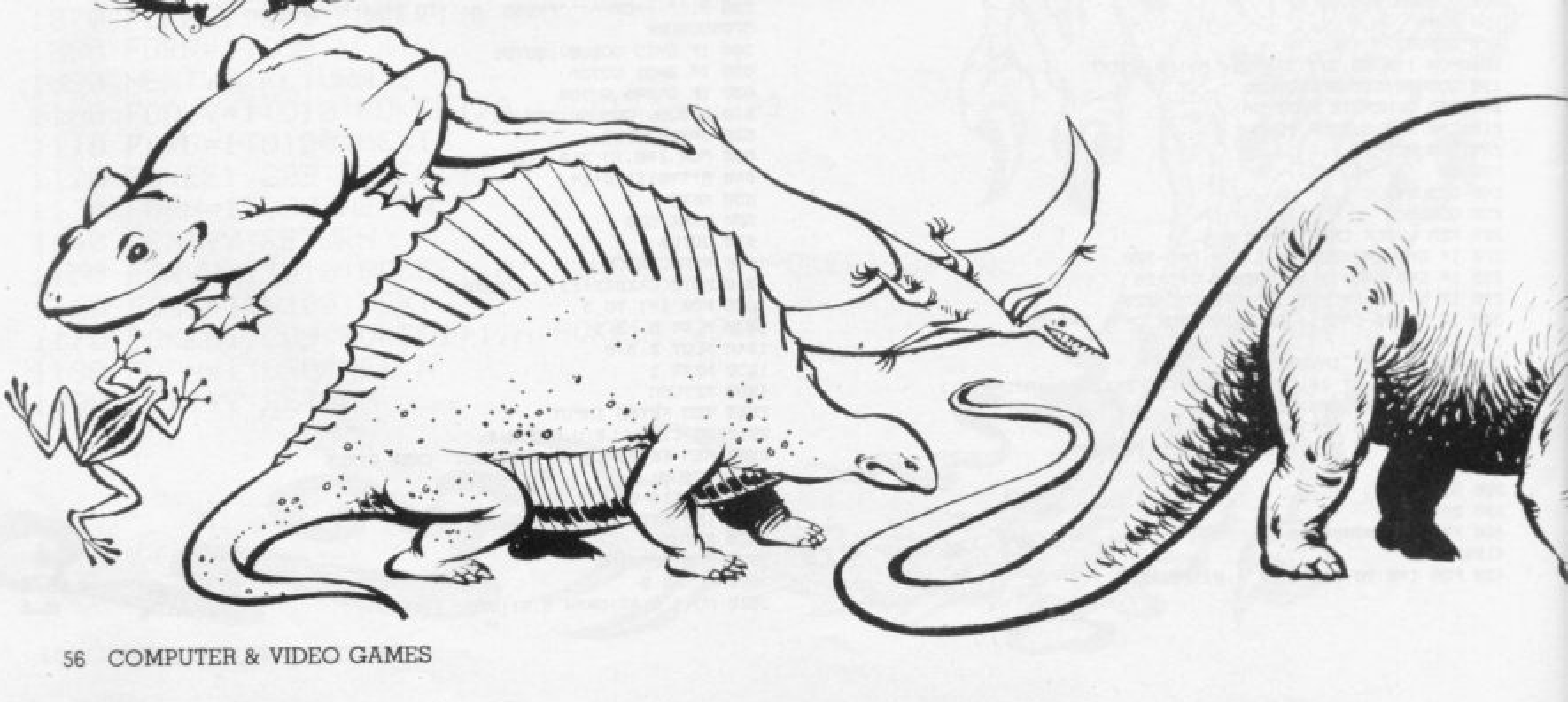
```
20 REM LIFE
30 REM BY TIM JACKSON, MAY 81
40 7#E1=0
50 GOSUB1
60 A=#3800;D=A+320;B=D+320
70 REM A HOLDS PATTERN
80 REM D HOLDS NEIGHBR COUNT
90 REM INIT.PATT.SAVED IN B
100 G=0
110 DIM LL0,SS13,GG13
120 FOR I=0 TO13;SSI=-1;GGI=-1;NEXT
130 DIM W64
140 P.#21
150 GOSUBM;GOSUBM
160 P.#6
170 GOSUB1
180mFOR I=0 TO 319 STEP 4; A!I=0; NEXT
190 GOSUBW;GOSUBM;GOSUBD
200 REM GENERATE PATTERN
210sC=0;REM CURSOR POSN
220 GOSUBC
230 DO
240 GOSUB9
250 GOSUBC
260 REM CHECK CRSR CTRLS
270 IF G=7 C=C+20; IF C>319 C=C-320
280 IF G=6 C=C+1; IF C%20=0 C=C-20
290 IF G=107 C=C-20; IF C<0 C=C+320
300 IF G=106 C=C-1; IF C%20=19OR C=-1 C=C+20
310 GOSUBC
320 REM IF SP, INVERT CELL
330 IF G=0 PLOT 14,(C%20*Z+ZZ),(C/20*Z+Z); ATC=ATC:1
340 FOR I=0 TO 300;NEXT
350 UNTIL G=13;REM UNTIL RTN
360 FOR I=0 TO 319 STEP 4; B!I=A!I; NEXT
370 GOSUBC
380 GOSUBJ
390 @=4;N=0
400 PRINT N,#8#8#8#8
410tDO
420 FOR I=0 TO 319 STEP 4;D!I=0;NEXT
430 REM SCAN CELLS
440 LINK 550
450 REM GENERATE NEXT GEN.
460 LINK GG0
470 N=N+1;IF N>9999 N=0
480 PRINT N,#3#8#8#8
490 I=0
500 DO I=I+1
510 LINK LL0
520 UNTIL I>V OR G<255
530 UNTIL G<255
540 P.#30'''''"PRESS  G"'"TO GO ON"'" --OR--"'
550 P."PRESS  P"'"FOR YOUR"'"ORIGINAL"'"PATTERN"
560 P.'" --OR--"'"PRESS  S"'"TO START"'"AFRESH"
5709GOSUBK
580 IF G=39 GOSUBJ;GOTOt
590 IF G=51 GOTOr
600 IF G<>48 GOTO9
610 GOSUBW;GOSUBM;GOSUBD
620 J=#2020202
630 FOR I=0 TO 319 STEP 4
640 A!I=B!I; D!I=J
650 NEXT
660 LINK GG0
670 GOTOs
1000 REM CURSOR
1010cMOVE(C%20*Z+Z3),(C/20*Z)
1020 FOR I=1 TO 3
1030 PLOT 8,-Z,1
1040 PLOT Z,Z,0
1050 NEXT I
1060 RETURN
2000 REM KEYBD INPUT
2010kDO LINK LL0;U.G<255;R.
2020 REM KEYBD INPUT & DETECT  CRSR CTRLS
20309GOSUBK
2040 IF G<6 OR G>7 RETURN
2050 IF 7#B001&#80=0 G=G+100
2060 RETURN
3000 REM HEADING
3010mCLEAR 0
3020 MOVE 0,47;DRAW 0,41;DRAW 4,41
```

➔

BY TIM JACKSON LIFE RUNS ON AN ACORN ATOM IN 12K



```
3030 MOVE 6,41;DRAW 6,47
3040 MOVE 8,41;DRAW 8,47;DRAW 12,47;MOVE 8,44;DRAW 11,44
3050 MOVE 18,47;DRAW 14,47;DRAW 14,41;DRAW 18,41
3060 MOVE 14,44;DRAW 17,44
3070 MOVE 0,39;DRAW 18,39
3080 RETURN
3090bMOVE 62,0;DRAW 62,34;DRAW 20,34;DRAW 20,0;DRAW 62,0
3100 P.$30''''''"USE THE"''"CURSOR"''"AND THE"'
3110 P."SPACEBAR"''"TO CREATE"''"& DELETE"''"CELLS,"'
3120 P."AND THEN"''"PRESS"''"RETURN"''"TO START"
3130 RETURN
3140JP.$30'''';FOR I=6 TO 16;P.''"                ";NEXT
3150 PRINT$30'''''''''"PRESS"''"SPACEBAR"''"TO STOP"
3160 P.$30$10$10$9$9$9$9$9$9$9$9$9$9$9"GENERATION NO:"
3170 RETURN
4000MP=#2800;K=#80;F=#5A;E=#3FE
4010[
4020 :LL0
4030 JSR #FE71; STY #328;RTS
4040\SET UP GRAPHICS-TOP RH CORNER
4050:GG0 LDA @0
4060 STA F+1;STA F+3
4070 LDA @60; STA F
4080 LDA @32; STA F+2
4090\A+256 IN K,D+256 IN K+2
4100 LDA @A&#FF; STA K
4110 LDA @A&#FF00/256+1; STA K+1
4120 LDA @D&#FF; STA K+2
4130 LDA @D&#FF00/256+1; STA K+3
4140 LDY @64
4150 LDX @1
4160:GG1 DEY
4170 TYA;PHA;TXA;PHA
4180 JSR GG2  DO NEXT GEN.
4190 PLA;TAX;PLA;TAY
4200 DEC F; DEC F
4210 LDA @20; CMP F; BNE GG3
4220 DEC F+2; DEC F+2
4230 LDA @60; STA F
4240:GG3
4250 TYA;BNE GG1
4260 DEX;BMI GG4
4270 DEC K+1;DEC K+3
```



FE

```
4280 JMP GG1
4290:GG4 RTS
4300:GG2
4310 LDA(K+2),Y
4320 CMP @3;BEQ GG5 BIRTH
4330 CMP @2;BNE GG6 DEAD
4340 LDA(K),Y
4350 CMP @1; BEQ GG5 STAY LIVE
4360:GG6
4370 LDA @0
4380:GG7
4390 STA(K),Y; STA F+4
4400 JMP(E)
4410:GG5
4420 LDA @1; BPL GG7
4430:SS0 LDA @(A+279)&#FF00/256
4440 STA K+1
4450 LDA @(A+279)&#FF;STA K
4460 LDA @(D+279)&#FF00/256;STA K+3
4470 LDA @(D+279)&#FF;STA K+2
4480 LDX @15
4490:SS2 LDY @40
4500:SS3 JSR SS1
4510 DEY; CPY @20; BNE SS3
4520 SEC; LDA K; SBC @20; STA K
4530 BCS SS4; DEC K+1; SEC
4540:SS4 LDA K+2;SBC @20;STA K+2
4550 BCS SS5; DEC K+3
4560:SS5 DEX; BPL SS2
4570 RTS
4580:SS1 LDA(K),Y; BEQ SS6
4590 STY K+4
4600 CPX @0;BEQ SS7
4610 TYA;SEC;SBC@21;TAY;JSR SS8
4620:SS7 LDY K+4;CPY@21;BEQSS9;DEY
4630 JSR SS13;INY;CPY@40;BEQSS10
4640:SS9 INY;JSR SS13;DEY
4650:SS10 CPX@15;BEQ SS11
4660 TYA;CLC;ADC@19;TAY;JSR SS8
4670:SS11 LDY K+4;RTS
4680:SS8 LDA K+4;CMP@21;BEQSS12
4690 JSR SS13
4700:SS12 INY;JSR SS13
4710 LDA K+4;CMP@40;BEQ SS6
4720 INY;JSR SS13
4730:SS6 RTS
```

```
4740:SS13 LDA(K+2),Y;CLC;ADC@1;STA(K+2),Y;RTS
4750];RETURN
6000lGOSUBm;P.$30''''
6010 P."THIS PROGRAM SIMULATES THE"'
6020 P."EVOLUTION OF A COLONY OF CELLS"'
6030 P."OVER SUCCESSIVE GENERATIONS,"'
6040 P."IN ACCORDANCE WITH THE"'"FOLLOWING RULES."''
6050 GOS.l;GOS.m;P.$30''''
6060 P."A LIVE CELL WILL LIVE IF IT HAS JUST 2 OR 3 NEIGHBOURS"
6070 P.","'"HORIZONTALLY, VERTICALLY OR"'"DIAGONALLY."'
6080 P."WITH OVER 3 NEIGHBOURS;IT WILL"'
6090 P."DIE FROM OVERCROWDING."'
6100 P."WITH LESS THAN 2, IT WILL DIE"'"OF LONELINESS."'
6110 P."IF AN EMPTY LOCATION HAS EXACTLY3 NEIGHBOURS, "
6120 P."A NEW CELL WILL BEBORN."'
6130 GOSUBl;GOSUBm;P.$30''''
6140 P."   YOU MUST SET UP THE INITIAL"'"PATTERN OF CELLS, "
6150 P."USING THE"'"DOUBLE-HEADED ARROW KEYS AT THE LEFT OF "
6160 P."THE KEYBOARD TO MOVE"'"THE CURSOR (WHITE SQUARE)."'
6170 P."   PRESS SHIFT TO REVERSE THE"'"CURSOR MOVEMENT."'
6180 P."   PRESS SPACEBAR TO CREATE OR"'
6190 P."DELETE A CELL AT THE CURSOR"'"POSITION."''
6200 RETURN
7000lP."**PRESS SPACEBAR TO CONTINUE**";LINK#FFE3;RETURN
8000wGOSUBm;P.$30''''''
8010 PRINT"WHAT GENERATION SPEED WOULD"'"YOU LIKE?"'
8020vPRINT"TYPE A NUMBER BETWEEN 0 (FAST)"'"AND 9 (SLOW)"
8030 INPUT", AND PRESS RETURN"',$W
8040 IF LENW>1 GOTOv
8050 IF ?W>#39 OR ?W<#30 GOTOv
8060 V=(?W-#30)*100
8070 RETURN
```



RUNS ON A TRS-80

BY ROBERT HALL

ENTRA

Entrapment is a deceptively simple strategy game which can be seen as a struggle for living space.

One of the best two-player games around, it requires fast reflexes, good control and the ability to think on the move and outwit your opponent.

Skill determines the outcome, yet it can be played and enjoyed by a four-year-old, the controls are that easy to master and the game's objectives so obvious.

The aim is to move a growing life-line into free space on the screen. That is space not taken-up by your own "tail", your opponent's "tail" or the boundaries of the screen.

As the screen gradually fills, so certain areas of it are cut off from one or both players. The winner is the player who can cut his opponent off with the least space to play with. And then just avoid mistakes until his opponent runs out of room and is forced to hit an existing line.

Take care not to reverse direction, as this is judged as running back into your own "tail".

The movement instructions are included in the table below:

Movement	left player	right player
UP	W	P
RIGHT	S	;
DOWN	Z	.
LEFT	A	L

```
1 CLS
2 REM **ROBERT C. HALL, III   (12/31/78)**
4 REM **PRINT THE INSTRUCTIONS**
5 GOSUB1000
10 CLS:PRINTCHR$(23)
11 PRINT"INPUT PLAYER ONE'S NAME:"
12 INPUTB$
13 PRINT:PRINT"INPUT PLAYER TWO'S NAME:"
14 INPUTC$
15 CLS
```

APMENT

```
16 REM **SET UP THE BOARD**
20 FORX=0TO127:SET(X,4):SET(X,47):NEXT
30 FORY=5TO46:SET(0,Y):SET(1,Y):SET(126,Y):SET(127,Y):NEXT
38 REM **PLAYER 1'S POSITION (X,Y): INCREMENTS A,B**
40 X=10:Y=10:A=0:B=0
44 REM **PLAYER 2'S POSITION (C,V): INCREMENTS D,E**
45 C=120:V=40:D=0:E=0
47 PRINT@1,B$;" HAS";RT;"WIN(S)";:PRINTTAB(23)"**ENTRAPMENT**";
48 PRINT@(50-LEN(C$)),C$;" HAS";RE;"WIN(S)";
49 A$=INKEY$:IF A$="" THEN 50 ELSE 49
50 A$=INKEY$
55 IFA$=""THEN 500
60 IFA$="A"THENA=-1:B=0:GOTO500
65 IFA$="L"THEND=-1:E=0:GOTO600
70 IFA$="Z"THENA=0:B=1:GOTO500
75 IFA$="."THEND=0:E=1:GOTO600
80 IFA$="S"THENA=1:B=0:GOTO500
85 IFA$=";"THEND=1:E=0:GOTO600
90 IFA$="W"THENA=0:B=-1:GOTO500
95 IFA$="P"THEND=0:E=-1:GOTO600
500 REM **MOVE THOSE PIECES**
513 IF(A=0)AND(B=0)THEN515
514 IFPOINT(X+A,Y+B)THEN 540
515 SET(X+A,Y+B)
520 X=X+A:Y=Y+B
530 GOTO600
540 PRINT@540,C$;" WINS";
541 RE=RE+1
545 FORX=1TO1000:NEXT:GOTO15
550 GOTO550
600 IF(D=0)AND(E=0)THEN620
610 IFPOINT(C+D,V+E)THEN 700
620 SET(C+D,V+E)
630 C=C+D:V=V+E
640 GOTO50
700 PRINT@540,B$;" WINS";
701 RT=RT+1
710 GOTO545
```

```
1000 REM **SUBROUTINE TO PRINT INSTRUCTIONS**
1005 CLS
1010 PRINTCHR$(23);
1020 PRINT"  I N S T R U C T I O N S"
1030 PRINTSTRING$(30,"*")
1040 PRINT"THIS IS THE GAME OF ENTRAPMENT"
1045 PRINT
1050 PRINT"THE OBJECT IS TO ENCLOSE YOUR"
1060 PRINT"OPPONENT AND FORCE HIM TO HIT"
1070 PRINT"A WALL.  COLLIDING WITH ANY"
1080 PRINT"LIT SPACE WILL RESULT IN THE"
1090 PRINT"LOSS OF THE GAME."
1100 PRINT
1110 PRINT"THE GAME CONSISTS OF TWO MOV-"
1120 PRINT"ING WALLS, EACH CONTROLLED BY"
1130 PRINT"A DIFFERENT PLAYER.  A CHANGE"
1140 PRINT"IN DIRECTION IS ACCOMPLISHED"
1150 PRINT"BY PRESSING CONTROL KEYS"
1151 INPUT"PRESS 'ENTER' TO CONTINUE";G$
1152 CLS:PRINTCHR$(23)
1160 PRINT"THE CONTROL KEYS ARE AS"
1170 PRINT"FOLLOWS"
1174 PRINT:PRINT
1180 PRINT"DIRECTION    PLYR.#1   PLYR.#2"
1185 PRINTSTRING$(30,"*")
1190 PRINT"  UP           W          P"
1200 PRINT"DOWN           Z          ."
1210 PRINT"RIGHT          S          ;"
1220 PRINT"LEFT           A          L"
1230 PRINT:PRINT:INPUT"PRESS 'ENTER' TO CONTINUE";H$
1240 RETURN
```



THREE SINCLAIR 1K WONDERS

Many games players find the limits imposed by 1K of memory as a frustration to be borne until they have saved up enough money to expand their computer.

Others accept the challenge to produce a worthwhile game within these restrictions and apply themselves via a little lateral thinking to come up with some of the most imaginative of computer games.

Here we present three such games, kindly donated by our inspired readers for Sinclair ZX81 owners to try out: Android Attack, Mole and Catch-a-Bag-of-Swag.

The first of our 1K wonders is **Android Attack** by Michael Kincaid and David Chapman.

The aim of the game is to shoot down as many advancing androids as possible before three escape your fire.

One point for each ailing alien and once the score gets past 10 the going gets harder as the creatures start from closer-in. The game is over when three androids have escaped.

To move your gun, the commands are: U- to move up; N- to move down; F- to fire.

The variables used are:

K = Your score
C = Number of androids that have passed you.
D = Where android starts across the screen.
P = Line where your gun is.
S = Line where android is printed on.
V = Movement of your gun.
T = Count for moving android across screen.

Iain McWilliams' **Mole** game is an original test of foresight and dexterity.

The program simulates a mole diving deep into his burrow. Unfortunately he is blind and has to be guided down using the "N" and "M" keys on the Sinclair keyboard.

Projections which have to be negotiated, stick out from either side of the tunnel and a point is scored for each move until the poor mole stumbles into a wall.

For such a simple game it is surprisingly addictive.

List of variables:

A = FOR ... NEXT loops and position of passage
P = Position of mole.
R = Character at mole's next position.
S = Counter of score.

List of subroutines:

At line 20 = print out passage.
At line 24 = check for next position of mole. Print out mole. Increase score and create next position of mole.

Catch-a-Bag-of-Swag by Julian Downes invites you to catch the money as it falls in bags from the bank above.

You have control of a catching "bucket" which can move left or right, using the "5" and "8" keys.

The bags are of random value and you must catch as many as possible to make the "blag" worthwhile. Once 15 bags have been dropped the game starts again. A check is kept of the highest score so make sure you catch the valuable ones.

A rundown of the program follows:

10-30 — assign variables — H = High score X = catcher position S = Score.
40 — M counts the number of bags dropped
50-60 — A determines (randomly) which bag falls B determines (randomly) its value.
70 — displays bank
80-140 — Makes bag fall & moves catcher
160 — Has catcher caught bag?
170-190 — if "Yes" then adjust score
200-210 — otherwise continue.
220-250 — Once 15 bags have been dropped, check for new high-score and adjust if necessary. Then start again.



ANDROID ATTACK

BY MICHAEL KINCAID & DAVID CHAPMAN

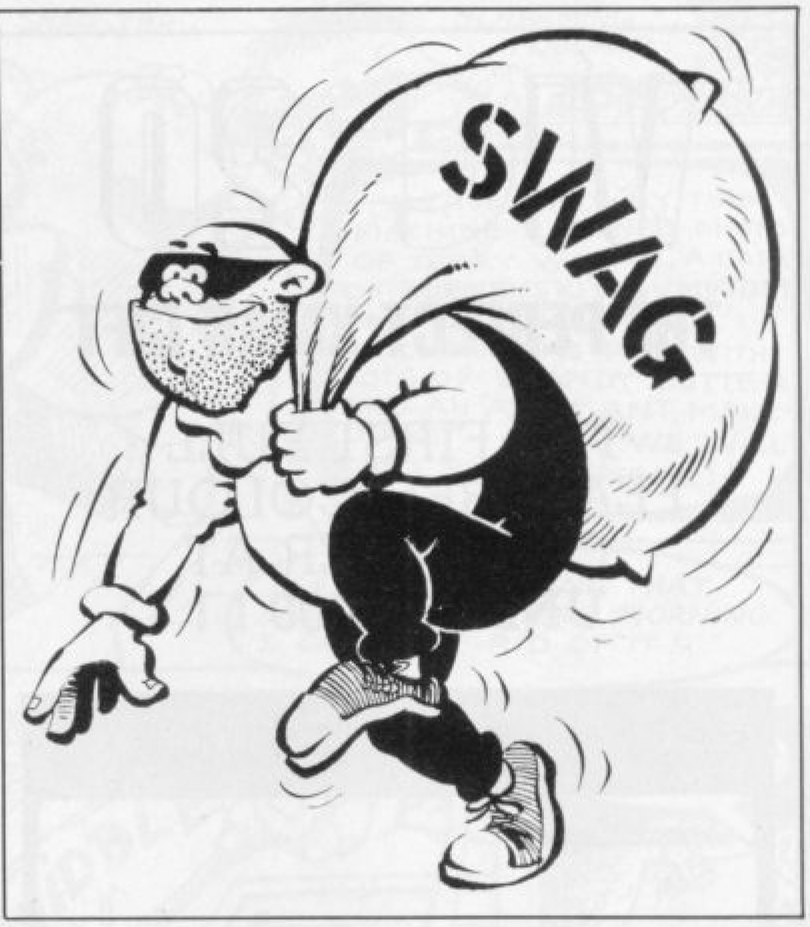
```
  1 LET K = 0
  2 LET C = 0
  3 LET D = 1
  5 LET P = 4
  6 LET S = 4
 20 FOR T = D TO 28
 30 PRINT AT S,T; "  ■■▬ "
 35 PRINT AT P,25; "<"
 45 LET V = 0
 50 IF INKEY $ = "U" THEN LET V = -4
 60 IF INKEY $ = "N" THEN LET V = 4
 65 IF INKEY $ = "F" AND P = S THEN GOTO 200
 70 IF P+V < = 3 THEN LET V = 0
 85 PRINT AT P,25; "  "
 90 LET P = P+V
100 NEXT T
105 LET C = C+1
106 IF C = 3 THEN GOTO 230
110 LET S = INT (RND ×4) ×4 +4
120 IF S > = 16 THEN LET S=4
130 GOTO 20
200 PRINT AT S,T; "          "
210 LET K = K+1
215 IF K> 10 THEN LET D = D+2
220 GOTO 110
230 PRINT "SCORE = "; K
```

MOLE

BY IAIN McWILLIAMS

```
2 FOR A = 1 TO 10
3 PRINT "■          ■"
4 NEXT A
5 LET P = 3
6 LET S = 0
7 LET A = INT (RND * 5+1)
8 GOSUB 20
9 GOSUB 24
10 IF R = 128 THEN GOTO 30
11 IF RND<.7 THEN GOTO 8
12 FOR A = 1 TO 4
13 SCROLL
14 PRINT AT 9,0; "■          ■"
15 IF RND<.3AND A>1 AND A<4 THEN PRINT AT
   9,P; "■"
16 GOSUB 24
17 IF R = 128 THEN GOTO 30
18 NEXT A
19 GOTO 7
20 SCROLL
21 PRINT AT 9,0; "■■■■■■■"
22 PRINT AT 9,A; "  "
23 RETURN
24 PRINT AT 3,P;
25 LET R = PEEK (PEEK 16398+ * PEEK 16399)
26 PRINT "+"
27 LET S = S+1
28 LET P = P+(INKEY $ = "M") - (INKEY $ = "N")
29 RETURN
30 PRINT AT 4,P; S
```





CATCH-A-BAG-OF-

SWAG

BY JULIAN DOWNES

```
10 LET H = 0
20 LET X = 0
30 LET S = 0
40 FOR M = 1 TO 15
50 LET A = INT (RND * 12)+2
60 LET B = (INT (RND * 5) * 10
70 PRINT AT 1,1; " ▌££££££££££££▐ "
80 FOR Y = 1 TO 9
90 PRINT AT Y,A; "£"
100 IF INKEY $ = "5" AND X<>0 THEN LET X =
    X-1
110 IF INKEY $ = "8" AND X<>11 THEN LET X =
    X+1
120 PRINT AT 10,X; "    ▌■▐   "
130 PRINT AT Y,A; "  "
140 NEXT Y
150 PRINT AT 10,A; "£"
160 IF A <>X+2 THEN GOTO 200
170 LET S ≐ S+B
180 PRINT AT 0,2; "SWAG = £"; S
190 GOTO 210
200 PRINT AT 10,A; "  "
210 NEXT M
220 CLS
230 IF H<S THEN LET H = S
240 PRINT AT 0,12; "HI-SWAG = £"; H
250 GOTO 30
```


MAL FUNCTION
T. HITCH
SNAG JNR
SCREAMING FOUL UP
THE BUGS
"PLEASE LEAVE BY THIS MACHINE: 1 SIGNED PHOTO OF TERRY WOGAN, A COPY OF DUBREVSKI'S SYMPTOM ANALYSIS, VOLUME 1. A CHRISTMAS PUD WITH LOTS OF BRANDY BUTTER AND AN ADAM ANT MAKE-UP KIT ··· OR WE WILL DO YOUR ELVES!!!
IT'S BEEN SAYING THAT SINCE CHRISTMAS MORNING I CAN'T GET RID OF IT!
MICROCOMPUTER REPAIR KIT
WE'LL SOON SORT IT OUT.
TWIDDLE!
HMMM! THERE'S A BLOCKAGE OF SOME SORT HERE.
HELLO!
WHISK!
..WHAT'S THIS?
HMM!! I'LL TRY AGAIN...
CHOMP!
?
GRR!
EEK!
RATTLE!
ADAM ANT MAKE UP
MEMORY BIN
I TOLD YOU HE'D SET THE REINDEERS ON US IF WE GOT HEAVY!

Adventure

EVERY adventure needs a few idiots (sorry, heroes) brave enough to test its terrors. So the computer must be able to decide the player's responses to given situations.

Following the arrays which we set up in the last issue, we will now make our adventure program recognise and act on the player's response. Let us assume that this will be in the form of a verb followed by a noun. We will assign R1$ to this and say it is "TAKE KNIFE":

300 FOR I = 1 TO LEN (R1$) : REM set up scan of R1$
310 IF MID$(R1$,I,1) = " " THEN 340 : REM find position of space
320 NEXT : REM space not found
330 PRINT "REPLY USING TWO WORDS" : STOP : REM temp. error message
340 LET R2$ = LEFTs(R1$,I-1) : LET R3$ = RIGHTs(R1$,LEN(R1$) -1)

We now have R2 = TAKE and R3$ = KNIFE, and must check to see if they are valid words — and if so, find their numerical identities.

All that we need do is to uniquely identify each word and can achieve this by using (say) the first three letters of each word, to establish strings like:
LET WI$ = "DROTAKKILTUR . . ." : REM drop take kill turn
LET W2$ = "KNIFISCOWAXE . . ." : REM knife fish cow axe
we can identify our words so:
350 LET R4$ = LEFTs(R2$,3): LET R5$ = LEFTs(R3$,3)
360 LET C$ = W1$: LET CC$ = R4$: GOSUB 2000

Line 350 standardises the variable names for entry into:
2000 FOR I = 1 TO LEN(C$)
2010 IF MID$(C$,I,3) = CC$ THEN RETURN : REM found it
2020 NEXT : REM not found — try again
2030 LET I = 0 : RETURN : REM not there — set I to zero

On return from this subroutine if I = 0 the word is not valid and we can continue:
370 IF I = 0 THEN PRINT "I CAN'T"; R2$; "SOMETHING" : STOP

However, in this case I = 4 and TAKE has been identified. We can now re-assign C$ = W2$ and CC$ = R5$ and go on to find the noun in the same way. First though, we must remember the value of I before it is changed on re-entering the subroutine.
380 LET K1 = I : REM now go on to find noun

As the program builds up, inevitably the strings holding valid words will lengthen, increasing the scan time of the FOR-NEXT loop. Can we speed things up? Yes — the trick is to amend line 2000 thus:
2000 FOR I = 1 TO LEN(CC$) STEP LEN(C$)

Since the words are now in three-letter blocks we can step by the length of the block and reduce the time by 2/3.

The second trick is really an illusion! Place the most frequently used words at the beginning of the string and the rarer ones towards the end.

BY KEITH CAMPBELL

Will you dare the deathmaze?

Deathmaze 5000 is a remarkable adventure. It is brilliant! It is maddening! That could be why its sequel is called "Asylum".

Author Frank Corr, was an 18-year-old Freshman at the Massachusetts Institute of Technology, when he wrote Deathmaze, after writing an English Research Paper on machine language.

Deathmaze is displayed graphically as a maze in perspective. Only forward movement is possible, by depressing the "up" arrow key. Movement in other directions is achieved by turning on the spot, using the remaining arrow keys, and thence moving forward.

A "save-game" feature is provided, which is just as well since the maze is reputed to have 500 cells spread over five levels. I can't verify this as I haven't managed to visit them all yet! To the side of the graphics is an updated inventory of objects and torches carried.

As you move you will occasionally come across a box lying on the floor. When over it you may open it and take the contents by typing the appropriate instruction.

There is no prompt — but, as if by magic, your words appear at the top of the screen. On hitting enter, the response replaces the instruction.

So what goodies are in the boxes? Would you believe a precision crafted frisbee? A mutilated sneaker? Hazards include execution by invisible guillotine and starvation if you have no food when your stomach starts grumbling (eating the sneaker only gives you heartburn!) — and — "That Room"!!

"That Room" has a way in — but please, please someone out there — is there a way out? What is the significance of the difference between 317 and 317.2? I have taken to listening to the BYRDS (turn turn turn) and resorted to Bible reading (Ecclesiastes Chapter 3 Verses 1 to . . .). I have tried reversing and turning. 317 = LIE??? Intrigued? Buy it and join me later in the Asylum!

● Deathmaze is available in 16K for the TRS-80 and Video Genie from the Essential Software Company but the 32K Apple version, only, from Med. Systems Software in the US.



Brainware



MIND ROUTINES

A storeroom which is 13ft square has in it three pyramids, all of different sizes, built from footballs each 1 foot 6 inches in diameter.

The pyramids have triangular bases (e.g. one on top, three on the next layer, six on the next and so on). It is noted that the number of layers in both the smallest and largest pyramids together is twice the number of layers in the other pyramid.

Using all of these balls it is possible to construct three pyramids with square bases, so that each pyramid has a different number of layers and is also different from the number of layers in each of the triangular pyramids.

(Square based pyramids have one ball on top, four on the second layer, nine on the next and so on.)

Can you tell me the number of layers of balls in each of the triangular and the square pyramids?

WIN OUR CHAMPAGNE

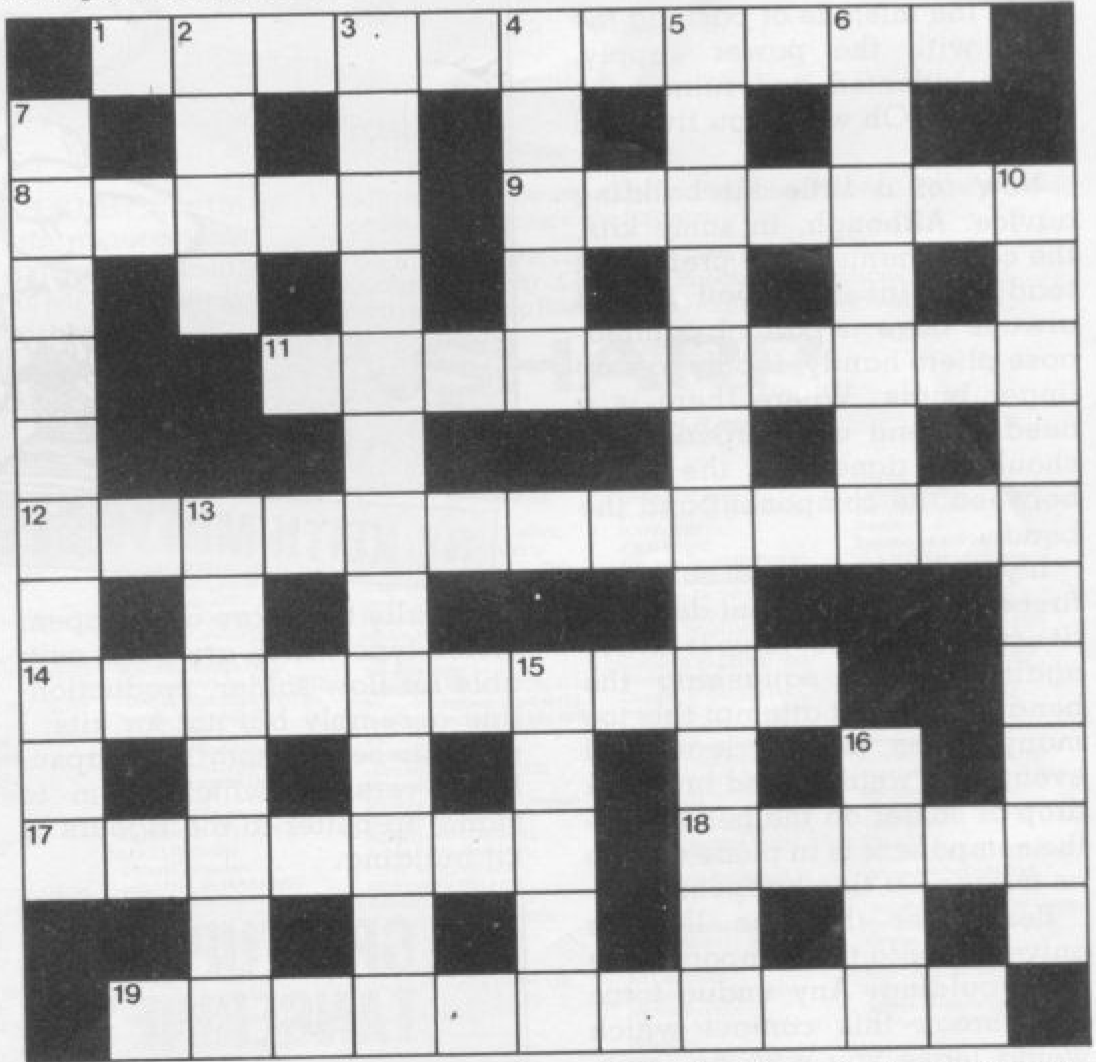
Two bottles of champagne are up for grabs on this page every month. The first correct answers out of the hat for both the Mind Routines problem and the crossword on 15 January will have bottles of champagne rushed to them. Ian Pedder's Mind Routines problem will test both your ability to think through a puzzle and set it out as a program. These lend themselves to solving by program. If you are more literary minded try Nevera's Crossword and see how you get on.

NOVEMBER WINNERS

Our November Mind Routines puzzle proved very hard. Alan Green of Reading Road, Winnersby, Wokingham was one of the very few who managed to get it right. Mr B Green of Anchorage Lane, Sprotbrough, Doncaster was first out of the hat with a correct Nevera Crossword solution.

See page 11 for the solutions to the December issue's Nevera Crossword and Mind Routines.

NEVERA CROSSWORD



ACROSS
1. Health giving computer diet such as 19 might bring his mentor (2, 5, 3, 1)
8. "Perfect" as the Blackjack program might say at the start (5)
9. Came to the point about E.D.P. rate (7)
11. Micros made of tiny nuts (5, 5)
12. Unpretentious integer (7, 6)
14. Thoroughly proficient but now obsolete chess computer (10)
17. Printer drive on the farmyard (7)
18. One of the wise men plotted on the screen (5)
19. Mr Chip's favourite computer (8, 3)

DOWN
2. Sounds like the mistake in ET x = 1 at this time of year (4)
3. Like VIC's screen and Joseph's coat (13)
4. Install a terminal part in the future (5)
5. R2D2 characters! (13)
6. B.A. or I.B.M. programmed to produce a Galaxian missile (3, 4)
7. Micro in the lost and found columns? (7, 3)
10. Undressed and reduced in dimension (10)
13. Having the will to test a Texas program segment (7)
15. Obey the tennis game instructions to start with (5)
16. Program control structure bag (4)

● For details of *Computer & Video Games* competition rules see page 11.

Kit Korner

BY KEITH MOTT

GRIPE OF THE MONTH

GRIPE of the month goes to all those makers who do not supply transistor pads with their kits. This would do away with all those blown transistors I have come across — especially in the ZX81 — owing to excess heat when soldering.

Although I have been critical of the ZX81 in the past I do have some good news for those of you with problems. It appears that Sinclair are prepared to repair, free of charge, machines which have been opened or even tampered with, so long as this was not the reason for the fault.

They also have a very good spare parts department which I have already made use of. I made the mistake of packing the ZX81 with the power supply, which indented and ruined the keyboard. Oh well, you live and learn.

Now for a little kit building advice. Although, in some kits, the components come preformed ready for insertion you should always have a pair of pointed-nose pliers handy, if only to stop finger burns. Where there is a need to bend up components it should be done with the pliers between the component and the bend.

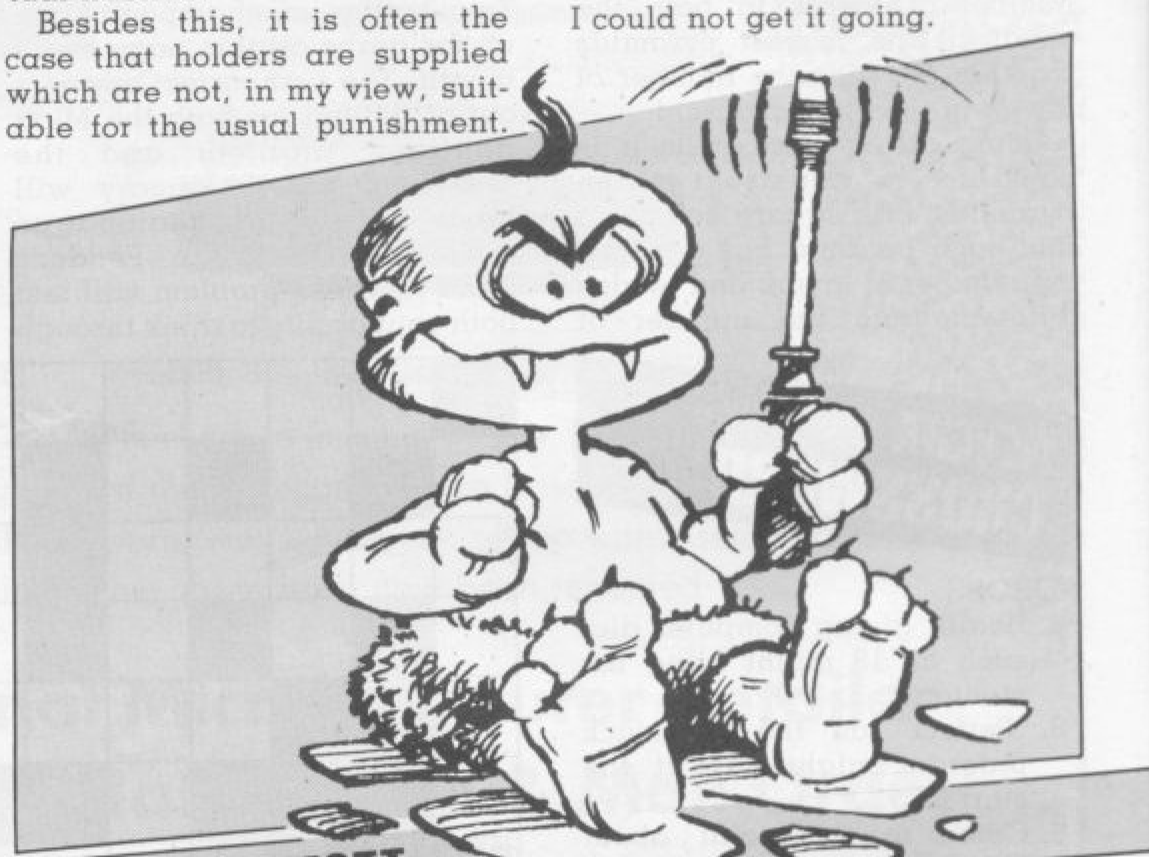
If you are not quite accurate at first and the component does not fit correctly, do not force it in. Try again by first squashing the bend flat. Do not attempt this too many times as the lead will eventually weaken and break. A drop of solder on the bend, once the component is in place will do as a bodge if this happens.

Remember that the lead is only held onto the component by the moulding. Any undue force may break this contact which would leave you with an invisible open circuit.

A helpful tip when "building up" the components in layers on the board is to use a piece of sticky tape to hold them in. The other way is to use a piece of foam to turn the board over onto. This allows for components of different depths to be soldered in at the same time.

When it comes to chip holders I am bound to complain, not only about the kit builders but also to the suppliers. So many times have I seen holders raised off the board, if not at both ends, then at least one. This leads to increased stress and strain on the pins and, with the great number of times kit builders' heavy hands get to them, eventual fracture.

Besides this, it is often the case that holders are supplied which are not, in my view, suitable for the usual punishment.



Generally these are of the open, Molex type which are quite suitable for flow-solder, production-line assembly but not for kits. I prefer to see the totally encapsulated versions which seem to stand up better to the rigours of kit building.

OPEN UP A TANGERINE

One kit that uses this type of open socket extensively is the Tangerine Microtan 65. The board, however, is so well laid out that each one should go in with no trouble at all. Be sure to solder in all the components before the holders as they are all very close together and can be very fiddly.

Tangerine have made the commendable decision to supply most of their expandable system in cost-saving kit versions as well as pre-assembled. If the other boards are of the same high standard as the Microtan 65 there should be no problems. Make sure, though, that you have made all the links on this board as directed. I forgot and it took me a while to figure out why I could not get it going.

Tangerine have a very good service department which accepts problems over the telephone and is very helpful. There is also a Tangerine User Group which aims to help the beginner, as well as the advanced owner, with his or her new machine.

If a company is prepared to offer its products in kit form then it should also be prepared to answer problems from the public. Most do, but it may pay in the long run to find out the ones who do not and keep away from them. On the other hand, there may — as in the case of Tangerine — be a user group to which you can turn, if in difficulty.

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You'll find all the help and advice you need about the MZ-80K at your Specialist Sharp Dealer in the list below.

If there is no dealer in your area, or if you require any further information write to:- Computer Division, Sharp Electronics (UK) Ltd., Sharp House, Thorp Road, Newton Heath, Manchester M10 9BE

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Sinclair ZX81 Personal Computer – the heart of a system that grows with you.



1980 saw a genuine breakthrough – the Sinclair ZX80, world's first complete personal computer for under £100. Not surprisingly, over 50,000 were sold.

In March 1981, the Sinclair lead increased dramatically. For just £69.95 the Sinclair ZX81 offers even more advanced facilities at an even lower price. Initially, even we were surprised by the demand – over 50,000 in the first 3 months!

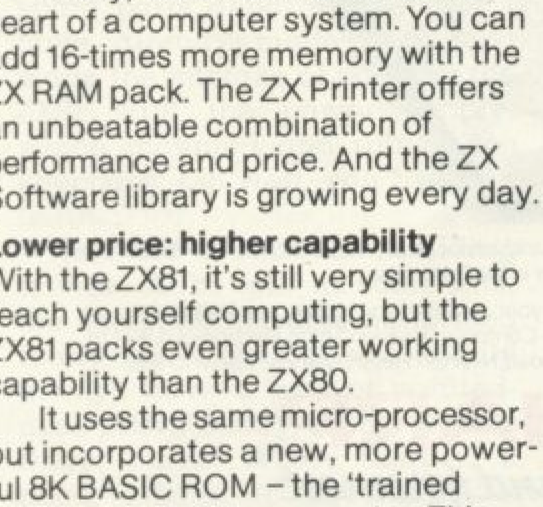
Today, the Sinclair ZX81 is the heart of a computer system. You can add 16-times more memory with the ZX RAM pack. The ZX Printer offers an unbeatable combination of performance and price. And the ZX Software library is growing every day.

Lower price: higher capability

With the ZX81, it's still very simple to teach yourself computing, but the ZX81 packs even greater working capability than the ZX80.

It uses the same micro-processor, but incorporates a new, more powerful 8K BASIC ROM – the 'trained intelligence' of the computer. This chip works in decimals, handles logs and trig, allows you to plot graphs, and builds up animated displays.

And the ZX81 incorporates other operation refinements – the facility to load and save named programs on cassette, for example, *and* to drive the new ZX Printer.



New BASIC manual

Every ZX81 comes with a comprehensive, specially-written manual – a complete course in BASIC programming, from first principles to complex programs.

Kit: £49.95

Higher specification, lower price – how's it done?

Quite simply, by design. The ZX80 reduced the chips in a working computer from 40 or so, to 21. The ZX81 reduces the 21 to 4!

The secret lies in a totally new master chip. Designed by Sinclair and custom-built in Britain, this unique chip replaces 18 chips from the ZX80!

New, improved specification

- Z80A micro-processor – new faster version of the famous Z80 chip, widely recognised as the best ever made.
- Unique 'one-touch' key word entry: the ZX81 eliminates a great deal of tiresome typing. Key words (RUN, LIST, PRINT, etc.) have their own single-key entry.
- Unique syntax-check and report codes identify programming errors immediately.
- Full range of mathematical and scientific functions accurate to eight decimal places.
- Graph-drawing and animated-display facilities.
- Multi-dimensional string and numerical arrays.
- Up to 26 FOR/NEXT loops.
- Randomise function – useful for games as well as serious applications.
- Cassette LOAD and SAVE with named programs.
- 1K-byte RAM expandable to 16K bytes with Sinclair RAM pack.
- Able to drive the new Sinclair printer.
- Advanced 4-chip design: micro-processor, ROM, RAM, plus master chip – unique, custom-built chip replacing 18 ZX80 chips.

Built: £69.95

Kit or built – it's up to you!

You'll be surprised how easy the ZX81 kit is to build: just four chips to assemble (plus, of course the other discrete components) – a few hours' work with a fine-tipped soldering iron. And you may already have a suitable mains adaptor – 600 mA at 9 V DC nominal unregulated (supplied with built version).

Kit and built versions come complete with all leads to connect to your TV (colour or black and white) and cassette recorder.



uter-



Available now- the ZX Printer for only £49.95

Designed exclusively for use with the ZX81 (and ZX80 with 8K BASIC ROM), the printer offers full alpha-numerics *and* highly sophisticated graphics.

A special feature is COPY, which prints out exactly what is on the whole TV screen without the need for further intructions.

At last you can have a hard copy of your program listings – particularly useful when writing or editing programs.

And of course you can print out your results for permanent records or sending to a friend.

Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

The ZX Printer connects to the rear of your computer – using a stackable connector so you *can* plug in a RAM pack as well. A roll of paper (65 ft long x 4 in wide) is supplied, along with full instructions.

16K-byte RAM pack for massive add-on memory.

Designed as a complete module to fit your Sinclair ZX80 or ZX81, the RAM pack simply plugs into the existing expansion port at the rear of the computer to multiply your data/program storage by 16!

Use it for long and complex programs or as a personal database. Yet it costs as little as half the price of competitive additional memory.

With the RAM pack, you can also run some of the more sophisticated ZX Software – the Business & Household management systems for example.

How to order your ZX81

BY PHONE – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day.
BY FREEPOST – use the no-stamp-needed coupon below. You can pay by cheque, postal order, Access, Barclaycard or Trustcard.
EITHER WAY – please allow up to 28 days for delivery. And there's a 14-day money-back option. We want you to be satisfied beyond doubt – and we have no doubt that you will be.

To: Sinclair Research Ltd, FREEPOST 7, Cambridge, CB2 1YY.

Qty	Item	Code	Item price £	Order Total £
	Sinclair ZX81 Personal Computer kit(s). Price includes ZX81 BASIC manual, excludes mains adaptor.	12	49.95	
	Ready-assembled Sinclair ZX81 Personal Computer(s). Price includes ZX81 BASIC manual and mains adaptor.	11	69.95	
	Mains Adaptor(s) (600 mA at 9 V DC nominal unregulated).	10	8.95	
	16K-BYTE RAM pack.	18	49.95	
	Sinclair ZX Printer.	27	49.95	
	8K BASIC ROM to fit ZX80.	17	19.95	
	Post and Packing.			2.95
			TOTAL £	

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CHRISTMAS 1982

WHAT'S IN STORE

TOY TRENDS

The British toy industry is quickly off the mark after Christmas, planning its new year at the toy and hobby fairs of January.

These shows are aimed at the trade and give manufacturers a chance to enlist distributor and retailer support for the toys and games which children will be clamouring for next Christmas.

The computerised and electronic toys field is a competitive one and cloaked in secrecy but COMPUTER & VIDEO GAMES is unwrapping a few of the toys early to show you what's in store.

The hand-held games will continue to be popular in 1982, mirroring the best arcade games and a lot of emphasis is being placed on small electronic games which can be used to keep children amused while travelling. Following the cinema trend, the games industry is indulging in fantasy themes and these will start to take over from the present rash of space games.

Chess and sophisticated logic games will be aimed at the adult gamesters and the computerised chess field promises to become especially competitive.

Some of the toys mentioned below will be available in stores from January but in many cases, stocks will not reach the shops until the middle of the year at least.

Our preview of the toy fair will give you an idea of how the toy and games industry is approaching the coming year and what to look out for when the time comes to fill the Christmas 1982 stocking.



KORCHNOI GIVES HIS CHESS VOTE

The world's No. 2 chess master, Viktor Korchnoi has put his name to an electronic chess game which is on show for the first time at the Earls Court Toy Trade Fair.

The player who reached the final of the World Chess Tournament on the last two occasions has endorsed one of the newest chess games around. The game, the Westrak CC3, is a sophisticated electronic chess game which has several improvements on the first version of this series.

There are now 25 standard random opening moves, you can alter your strategy of play or rectify mistakes by making use of a special facility, which allows you to have up to three full moves backwards and three full moves forward.

The response time of the machine's moves have been cut. Giving a response, on skill level one, straight away, on level two, in 16 seconds, and up to 28 minutes on the top level.

During the game the L.E.D.s light up to reveal the computer's thinking on its next move. You have an advantage over the computer because you can step in and stop the game at any time by using the halt key.

One of the nicest things about the Westrak CC3 is its price. It will cost between the £150 and £160 mark — very competitive.

AN ALIEN IN THE HAND . . .

The heavens are filled with fast-flying alien creatures and enemy saucers raining relentlessly down on your home base in the Galaxy 10,000 hand-held electronic game.

Your task is to leap to the defence of your people. Specially selected for the job it is up to you to shoot down the race against you. With a swift deftness of hand you must move the firing base across the L.C.D. screen to avoid the laser shots from the attacking force.

Due out in the shops in the next couple of months Galaxy 10,000 carries a price tag of £28.95. U.K. distributors Computer Games claims that this new toy will give hours of compelling entertainment, justifying the price.



ESCAPE THE RAVENOUS GHOULS

Keep those ghouls at bay when they chase you through a difficult maze, eager to devour you at the first chance.

Dart off down the tunnels of a complex maze, eating up the dots covering the path as you go. PacMan 2 is a new hand-held toy on show for the first time at Earls Court British Toy and Hobby Fair. Billed as a "third generation" electronic toy it is one of the first hand-held versions of the popular arcade game Puckman.

PacMan 2 is rectangular in shape with an oblong L.C.D. screen on the uppermost face of the toy. It's for either one or two players, the controls for each being at the two ends of the screen.

The player controls the eater — usually referred to as the pacman or munchman — by using the four directional keys so that you can move him up, down or to the left and right.

You have to keep concentrating to spot the whereabouts of the ghosts and make sure you don't get your pacman locked in a dead-end section of the maze, or surrounded inescapably by his pursuers.

In the four corners of the screen are four energy posts which enable the pacman to eat his pursuers and score bonus points.

An added feature of PacMan 2 which sticks as truly as possible to the arcade version, are the two tunnels on each side of the maze.

PacMan 2 is made by Entex but distributed by Leicestershire based A.A. Hales. It will be in the shops later in the year selling for about £30 but could be as much as £35 depending on the shop manager's discretion.

CHALLENGE TO AN EASTERN TUSSLE

A hardened electronic eastern gentleman will challenge you to a tussle in one of the most original new games planned for 1982.

The game cashes in on the current martial arts boom which is filling gymnasiums up and down the country with grunting white-robed practitioners of the new self defence disciplines.

Called Blackbelt, it consists of a three dimensional action man in his judo gear, mounted on a plastic base. He challenges the player to fight him by making the appropriate limb whip into action.

On each of the Blackbelt's lightning limbs is an L.E.D. light. When one of those flashes on it means that part of the body is about to strike a blow. By pressing the right button you must hit back with the correct leg, arm or foot. You'll also hear the devilish laugh of Blackbelt when the lights go on, warning you of his intentions.

There are three skill levels for you to progress to when you become an expert in this form of martial art. The faster you retaliate with Blackbelt's flashing arms and legs, the harder the game gets — as the lights on the limbs speed up.

The in-built electronic scoreboard notes the player's score after each game. Each game lasts one minute, but the quicker you can move the man's limbs, the more blows will be packed into that time. If you are not sure of your score after playing a game and the light has gone out, wiggle one of the parts of the body and the score will flash up again. Top score is 200 points.

Blackbelt is just one of the new range of electronic toys brought out for 1982 by Oxfordshire based Action Games and Toys. Its retail price is listed at £10 making it very affordable.



PASS THE TIME WITH AN OCTOPUS

A small but compulsive set of games is bound to capture attention, not only at this year's toy fair but for the months to come.

These compulsive items come in the Game and Watch series — a range of pocketwatches which double up as electronic games. The new ones include titles like Chef, Octopus, Popeye, Mickey Mouse, and Parachute.

In Chef, for instance, the idea of the game is to catch flying missiles in the shape of food or kitchen utensils which seem to be affected by dangerous poltergeists. You operate the chef using a control button at the side of the unit and make him run across the screen catching objects which are whizzing through the air.

If you find you can notch up a high score on the first level of play, progress to the higher level. All the games have two skill levels and store the highest score in the memory cells.

In Octopus, the scene is set on the sandy bottom of an ocean. The player operates a diver who is attached to a small boat floating on the water's surface. It is his job to recover pieces of treasure which are sunk tantalisingly in the sand a good walk away. But beware the Octopus.

Being more sophisticated than the original versions of Game and Watch these new ones are more expensive at £22.95.

PICK OF THE PUCKMEN?

Following up the Puckman craze in the arcades last year are a handful of hand-held versions.

You will be able to carry your machine around with you to perfect your technique at any time. Adam Imports' Munchman, is a typical example. The object is to score as many points as you can by manoeuvring a man around the paths of a maze. As long as he keeps eating the dots of the maze the man's energy is kept charged. The chip controlled monsters on the man's trail can digest him, if he is caught.

Munchman features multi-coloured L.C.D. displays showing the monsters, the man, the dots and the labyrinths of the maze. The points system works on the number of dots chewed up and bonus points for any monsters that you manage to gobble up.

One of several hand-held versions of Puckman to be stocked on shop shelves this year, Munchman will retail for £25.95.

Computer Games has also brought out a version of this game. Called Puck Monster, it is more or less the same game with a different title. The major difference between the toys is in price. Computer Games' toy will sell for £28.95.

The third is by A. A. Hales and is dealt with above. Three versions of Puckman are now out because the manufacturers anticipate demand for such a hand-held toy will be very large, but which is the best of the bunch can only be judged in the fullness of time.

MORE GAMES TO WATCH OUT FOR

Watch the hours while away on your wrist and play an electronic game at the same time.

A new type of watch will be in the shops this year with a practical and entertaining concept involving a simple but compulsive game. These watches look like ordinary digital ones but the figures are displayed on the L.C.D. screen at the very top, taking up about one quarter of the whole face.

The rest of the face is filled with a variety of L.C.D. symbols which make up one of four different games, Firing Squad, Alien Assault, Missile Strike and Blast Away.

On the face of the watch are two buttons which the player uses to control the games. All the games have a "war" theme and involve darting from one side of the screen to the other, avoiding well-aimed bullets, firing rockets to wipe out the enemy creatures, blasting missiles from enemy craft and engaging in battle with tank squadrons.

An L.C.D. indicator on the front of the watch-face keeps track of the score. Press a button and you can hear the watch bleep when you bombard the enemy with your missiles. The watch's power supply comes from tiny batteries used in ordinary digital watches and these **are** included in the price.

The housing for the watch face is made of black plastic which should withstand the odd heavy knock. Game-Time watches are made in the U.S. and are being distributed through Woodford-based Computer Games. The expected price for them is set at £29.95.



PRACTICAL PRACTICAL PRACTICAL

PROGRAMMING

By TED BALL

GET TO KNOW YOUR BUGS

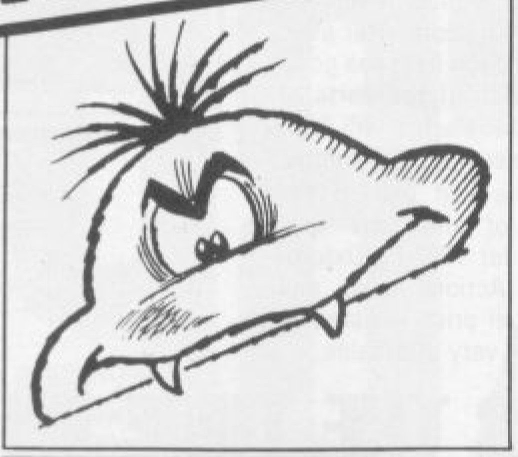
There is a limit to how much anyone can enjoy tracking down the programming errors that inhabit newly keyed-in creations.

It is possible to write programs that run correctly the first time, but except for the shortest and simplest programs there are nearly always some errors. Locating and correcting errors can be a time consuming process and is best approached systematically.

Copying and typing errors are easy to make, and much time and trouble can be saved by carefully checking the program listing on the screen (or hard copy if you have a printer) against the source from which it was copied. Many copying errors will produce an error message when the program is run, but this is not an infallible means of finding all such errors.

A large and complex program may include sections which are rarely executed and typing mistakes in these sections may not show up until the program has been in use for some time.

There are some common errors in copying that quite often do not lead to the system producing an error message but cause the program to give the wrong answers. These errors include the omission of a line, or a statement in a multi-statement line, and mistakes in copying variable names. Confusion between the numerals 0, 1, 2 and the letters O, I, Z is particularly common, and sometimes occurs in books and magazines when a program has been typeset instead of reproduced photographically from a printout. A simple example is LET X = BI + AI instead of LET X = B1 + A1. Basic will find nothing wrong with this, but the program will not give the right answer.



BUGS WITH WRONG ANSWERS

Another type of error which produces the wrong answers without giving an error message is due to misunderstanding the way your system evaluates complex expressions. For example, how are:

```
LET X = A/B*C
LET Y = A/B/C
LET Z = A*B**C
```

evaluated? If you are not sure how the computer will treat an expression you can write a short program to test it. However, it is safer to insert brackets, although they may be unnecessary, or to break up the expression into a series of simpler expressions, to ensure that it is evaluated in the way you intended. This is particularly advisable if the program is to be used by other people or transferred to a different machine.

EXECUTING BUGS

Errors which cause program execution to stop, include function arguments and array indices out of bounds (e.g. attempting to divide by zero, or access the 101st element of an array which has been dimensioned to 100).

Execution errors may be due to mistakes of the kind discussed above, but more often they are caused by errors in the program logic, particularly where the programmer has neglected to allow for special cases.

The cause of this type of error may not be immediately obvious; the error message will give the line number where program execution stopped but the ultimate cause of the error may be in a completely different part of the program.

If you have execution errors or wrong answers it is best to review the whole program, paying particular attention to the initialisation of variables and the destination of GOTO statements. Most versions of Basic initialise variables and array elements to zero, and it is possible for a section of a program to work correctly the first time around but give the wrong answer later on. For example:

```
1000 FOR I = 1 TO N
1010 LET S = S + A(I)
1020 NEXT I
1030 RETURN
```

If the program has not previously used the variable S this subroutine will return with S equal to the sum of A(1) to A(N) but afterwards it will start with the value left in S and add on to this.

You should also look for the converse of this type of error, where initialisation is performed correctly at the beginning but is repeated at a later stage when it is not required.

You also need to be careful with the condition in IF... THEN... statements. It is usually straightforward to decide whether to have; IF A < B rather than IF A <= B, but in more complicated cases, where A and B are expressions, or where there is a sequence of IF ... THEN ... statements it can be difficult to get it right. Any complicated tests should be worked out carefully when designing the program and if the resulting code does not work properly it is usually quicker to start again.

A BUG IN YOUR ARITHMETIC

The accuracy of the arithmetic performed by Basic is a frequent source of bugs and it is difficult to find why a program is going wrong unless you know the reason for the inaccuracy. Although numbers are entered in

decimal, Basic converts them to binary for internal storage and calculation and converts back from binary to decimal to print out the answers. Very few decimal fractions can be converted exactly to a binary fraction and two binary fractions which, in the computer's internal representation, differ by a very small amount, may print out as exactly the same decimal number.

If your program is going wrong on the statement IF A = 0 THEN . . . you may find that when you insert the statement PRINT "A ="; A immediately before this test that the machine gives A = 0. However, if you ask the machine to print A*(10**10) you will probably get a non-zero answer.

These errors in conversion between binary and decimal can produce some very odd results. For example, on the ZX81 the command PRINT .25 — ¼ gives the answer 0, while PRINT ¼ — .25 gives 1.1641532E-10. The ZX81 calculates ¼ by division and gets the answer exactly right, but when converting .25 into binary the result comes out 1/2**33 short of the exact answer, and by some peculiarity in the subtraction routine, does not give consistent results.

There is usually no problem with integer calculations, but with decimal calculations you cannot rely on the computer producing exactly the same answer you would get by doing it with pencil and paper. You should allow for small errors by testing for two numbers being sufficiently close, rather than testing for equality. For example, instead of IF A=B THEN . . . you should put something like IF ABS(A-B) 1B5 THEN . . .

Decimal/binary conversion errors can also cause problems in FOR . . . NEXT loops with a fractional step. The two following programs demonstrate what can happen:

```
10 LET X = 0
20 FOR I = 0 TO 10 STEP 0.01
30 PRINT I, X
40 LET X = X + 1
50 NEXT I
```

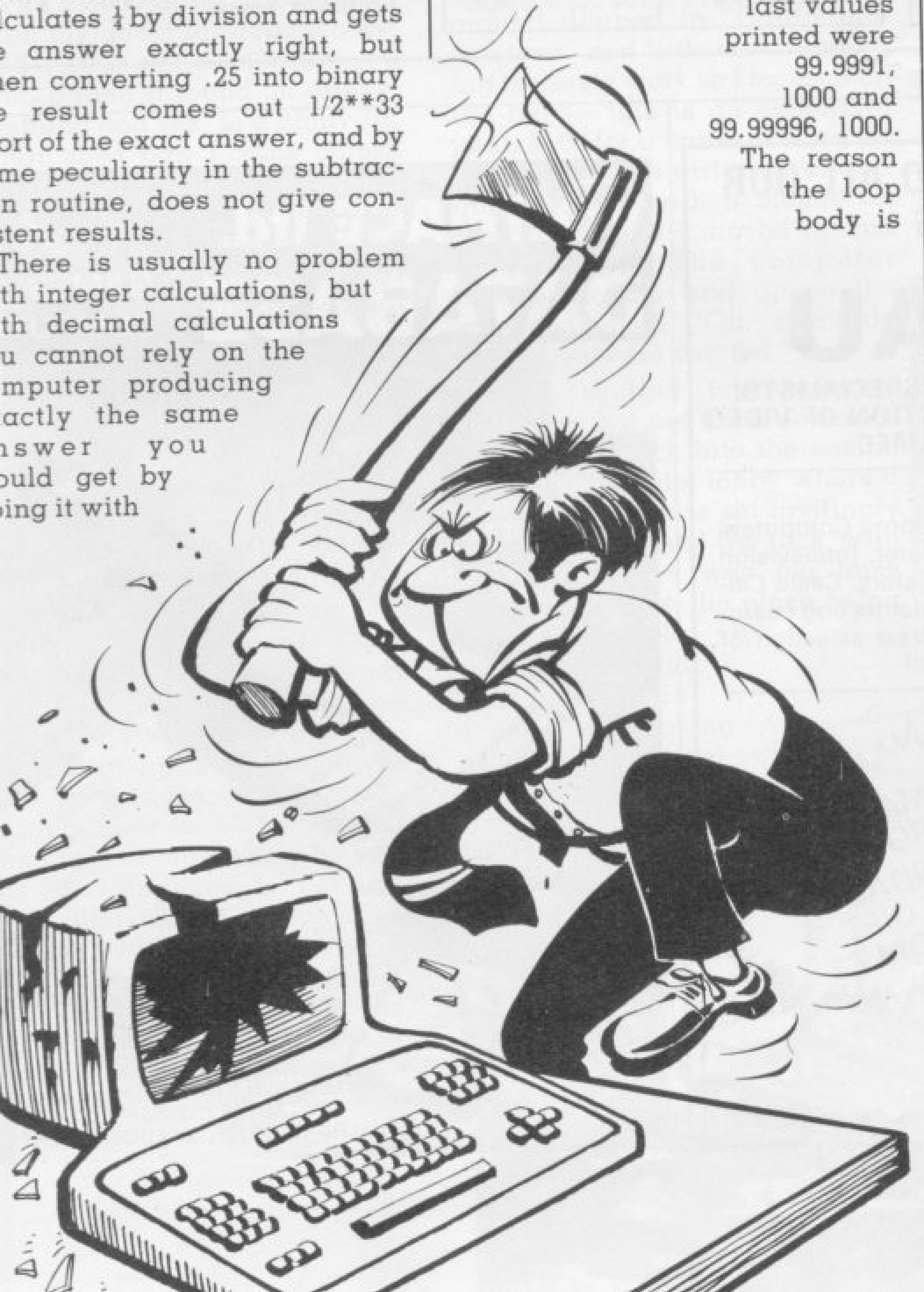
```
10 LET X = 0
20 FOR I = 0 TO 100 STEP 0.1
30 PRINT, I, X
40 LET X = X + 1
50 NEXT I
```

I tested these on two different machines and found that in the first case the last values printed were 9.99013, 999, and 9.9900002, 999, while in the second case the last values printed were 99.9991, 1000 and 99.99996, 1000. The reason the loop body is performed a different number of times in the two cases lies in the way Basic executes the NEXT statement. When NEXT I is encountered Basic adds the step to I to get the new value of I and compares this to the upper limit. If the new value of I is less than or equal to the upper limit the loop body is performed again; Basic will not exit the loop until the new value of I is greater than the upper limit.

When conversion or rounding errors make the value of I a little greater than it should be, Basic may exit the loop prematurely.

A useful method for tracing bugs is to insert extra PRINT statements into the program, to give the values of variables at points where you suspect the program is going wrong. In many cases this will show immediately why the program is going wrong.

Where the bug is particularly obscure you may have to use this method to trace the operation of the entire program. There are debugging packages available for some microcomputers, for example the Pet Toolkit, which can be very useful for debugging large programs. The routines available include TRACE, which displays the line number currently being executed, and DUMP, which prints out the values of selected variables every time they are used.



FLUSH THEM OUT OF THE SYSTEM

System bugs often receive little publicity. There is an arithmetic bug in the ZX81 which results in SQR (.25) being printed as 1.3591409 (although SQR (1/4) comes out correctly). I have seen this mentioned in only three magazines, one of them being a specialist ZX80/81 publication. If you have a ZX81 with this bug you can obtain a corrected ROM by writing to Sinclair Research.

Another recently discovered bug occurs in many versions of Microsoft Basic, resulting in the incorrect handling of string assignments of the form LET A$ = A$ + B$ + C$ when there is very little free memory available.

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GAMES COMPUTER



SOFT PORN

IN THE sleazy streets of Lost Vagueness the traveller is subjected to the worst in vice and filth in the form of sex, drugs and rock 'n' roll.

The nearest thing to wizardry in this adventure game is a magic mushroom which sends your vision haywire and turns your brain into a psychedelic haze of pretty colours.

Softporn Adventure is delightfully seamy in theme throughout but humorously entertaining too. The purpose of the game is to find and seduce three women.

It was like a dream. I awoke to find myself in the year 2000 A.D. in a wicked world in which the skies had turned green from plutonium pollution. I opted to go on holiday in a notorious gambling town where the only things people are interested in are drink, women and money. This is only a game though and you don't get "hands-on" experience yourself. You operate a puppet which becomes your eyes and ears.

With $1,000 in my pocket I set off on my quest for debauchery, but $1,000 is not a lot when you want to fling it round on drinks, gambling and sex. In a dimly-lit, ill-furnished bar, I came across my first barrier to "sex-cess". A closed curtain was in the way and only after guessing the password could I walk through the curtain to discover what fruits lay behind.

Tamely I tried classic words like "abracadabra". When that got me nowhere I ventured on to more imaginative words like "sex", "booze", "women", "perversion" (I won't ruin it by telling you what the password actually was). After exhausting a list as long as my arm, frustration had set in and I needed to feel a shot of whisky coursing through my veins. But $100 a go . . . oh it's a sign of the times.

I took a break to gather my thoughts, and then started investigating the area. So far the only human I had crossed paths with was the degenerate barman, never mind a lady of easy virtue.

The whisky had gone straight to my bladder so I took a trip to the bathroom. Filth lay there too. The toilet hadn't been flushed for months. The computer was right — it stank. On the walls were scrawled feet of seedy graffiti, like: "Computer freaks peek before they poke".

The key to the game is the amount of money you have on you. It's vital for bribing people (like the pimp in the bar's backroom who wants $2,000 before you can go upstairs to investigate further), entry to the disco (a perfect place to pick up a girl), buying drinks and betting in the casino.

If you run out of money, the chances are that you will come unstuck and be unable to proceed. The way to build up your cash supply is to try your hand in the casino.

You can either play on the slot machines or at blackjack but the bets are fixed at $100 a throw so it's too easy to whittle away your cash. Very easy for me anyway — that's where I made my first mistake. I lost all my $1,000 on blackjack but being an optimist I carried on playing.

Luck was on my side, or so I thought at first, and I found a passcard which got me into the disco. Girls galore were milling around daubed in "Californian sun tans" and little else. Gambling is thirsty work so I focused on the bar — this is an expensive joint, $100 for a bottle of wine. At last I'd found a girl, and after a quick boogie with a blonde on the dance floor I moved in and kissed her. The computer bleeped loudly and up on the screen flashed "Oh, don't do that, it gets me excited."

She rebuffed my amorous advances but not to be deterred, I stumbled back into the casino and into the hotel lobby where a voluptuous blonde sat invitingly behind the desk. No luck with her either, she was too busy working despite the place being devoid of people.

I blundered into a garden where I found a tasty looking mushroom, so feeling a bit peckish I ate it, I've heard that mushrooms have magic powers but this one beamed me into another place — still penniless.

There are three alternatives if you run out of money. Go to Hell and the game ends. Be teleported back to life unharmed. Stay and try again in the game, though without any money it is pointless.

The aims and format of the game are reminiscent of most adventures but the frustrations perhaps a little more intense. There is no graphical picture on the screen, just written descriptions of what confronts the player. There is a nice line in cheeky replies to unlikely, or sometimes, downright unsocial requests.

On kissing a girl it issued a series of frantic bleeps and stars filled the screen — if a seduction had taken place it would probably have exploded! But obviously my sex counted against me and I found no women willing to respond to my charms.

I was disappointed not to successfully seduce any women, mainly because I was intrigued (and still am) to find out just how the computer would react. If any of you know the truth I am waiting eagerly to hear it.

UK suppliers of Softporn are SBD Software in Richmond. It runs on a 48K Apple and costs £17.95 — far cheaper than a real night in "Sin City".



BY ELSPETH JOINER

WIGGLING GOOD FUN

SNAFU

If you have a phobia about things which wriggle and grow, you'll want to stay well away from the screen when Snafu the snake game is being played.

The two snakes in the latest cartridge for the Intellivision home games centre, are not poisonous, they're the constricting variety. Their aim is to choke the life out of one-another by cutting down the living space in their two-dimensional world.

Take control of one snake and try to outwit your opponent as both creatures grow to gradually fill and cut-off areas of the screen.

It requires quick wits and some close control to succeed in out-manoeuvering the opponent's snake, forcing him to double back on himself, or maybe crash into the walls of the "pit", or his own bodily remains.

For sheer fast strategy it is a difficult game to beat. Keep one eye on your opponent's snake to see if he intends to cut you off from the bulk of the pit but make sure that your attention does not wander to the extent that you end up crashing yourself.

The game is marvellous proof that on computers simple ideas often work best.

Already a popular cartridge on other games centres, the Intellivision version costs £18.95 and is available from north London-based distributors, ACE.





MIND-BENDING TEST OF LOGIC

TREASURE HUNT

Treasure Hunt is a mind-bending game to test your memory and logic and stretch both to the limit.

For the Database TV games centre, the first version of the memory game comprises a matrix of blank squares displayed on the screen. This game is called "Flag Catcher" and you have to interrogate your own squares to discover where a flag has been hoisted.

The second game on the cartridge has you matching up pairs of coloured squares which appear on the screen, by trial, error and memory. Treasure Hunt will keep you deep in thought and can be obtained from Database suppliers for £14, or direct from Hertfordshire based manufacturers Voltmace.

Lovers of the game of Othello will be pleased to find a version for Database. This new cartridge has just been added to the range, available for this machine and is known as Box Clever.

But only the name has been changed to protect the mercenary and this version remains true to the popular board game.

The object of this tactical counter struggle is turn most of the board into your own colour by capturing your opponent's counters between two of your own.

A computer is suited to the game as it will not miss any captures during the turning sequence and can play a very reasonable standard of Othello. The idea is to provide an electronic opponent when no human one exists, but it is possible to play against your friends on the televison. The price is £14.

THE ONE THAT WILL ALWAYS GET AWAY

FISHING

Jaws has nothing on the monster that lurks just below the surface of the Activision Fishing pond.

But he is not a man-eater — his voracious appetite extends only so far as thwarting the two keen anglers from reaping too swift a harvest from the pond.

The two competing fishermen face each other over a deep stretch of blue water, which is alive with plump fish patrolling various depths.

Each angler has half the pond to call his own and into this he casts his line, up to halfway across but as deep as he likes.

The aim is to dangle the end of the line at the same depth as the eye-sockets of the fish and if the contrary creatures swims past, then the hook will bite.

The fish swim frantically back and forth in a fruitless effort to escape the line, but their thrashings do attract Jaws. The shark swims back and forth in a seemingly random pattern just below the surface gobbling up any fish he passes through.

He can change speed and direction very suddenly to thwart even the most alert angler and down the catch.

Fish near the surface are worth two points, those from the very deepest parts of the pond are worth six.

The first fisherman to reach 100 points takes the honours and the best tactics are to go for the deeper fish — as those caught in shallow waters fight just as hard to become shark-fodder and only reward their captors with a lower point total.

Two can play or one can try his luck against the computer, who proves a very able angler. The Activision cartridge is for use on the Atari T.V. games centre and costs £16.95.

SURVIVAL IN SPACE

SATELLITE ATTACK

A lone spaceship in the outer depths of the galaxy is making a brave bid for survival in a heavy meteorite storm.

You control the spacecruiser on its journey through space, firing lasers at the asteroids to split them up into, just as harmful but rather smaller, rocks. And ultimately these can be obliterated.



If the game sounds familiar, it is because it's based on that popular arcade game Asteroids and already features in some form or another on most of the TV games centre systems — this is Philips' version, Satellite Attack.

One change from the normal game is that this version features two types of meteorite.

An ordinary asteroid is worth one point for a direct hit. To get three points you must fire and destroy a magnetic asteroid. These can be identified by their constant high-speed spinning as they whirl across the screen.

You can boost your score by hitting alien spaceships which dart between the meteorites and these are worth 10 points apiece. But beware, the alien ships are piloted by beings equipped with super-laser guns which are computer controlled to home in your own spacecruiser.

Among the other features is a protective forcefield which comes in handy when an asteroid slips through your fire, seems set to collide with your ship.

This new cartridge for the Philips G7000 games centre costs £15.

VIDEO SCREEN



It is the games that a T.V. centre offers which will eventually make or break it in the high street.

Certain makes of T.V. games centre have become associated with their best-selling software and this is the mark of their success.

In video screens we will be looking at the "best sellers". Those cartridges which are always at the forefront of advertising campaigns and whose features set the standard which the rest of the machine's software must try to match.

To start this series off, we look at Mattel Intellivision's top-selling cartridge, Soccer.

THE ELECTRONIC TRIP TO A SOCCER SUMMER

BEST-SELLERS

The incredibly lifelike stars of the Intellivision Soccer game are the best advert Mattel and its British distributors, ACE, have in this football crazy country.

As a generation of youngsters once created their own World Cup thrills with Subbuteo tournaments in 1966, so a new generation will bring their own electronic Keegans and Brookings on to the fields of Spain in 1982. It all helps explain why Soccer is Intellivision's best selling cartridge.

Two teams of red and yellow players take to the Intellivision pitch to the accompaniment of the cheers and whistles of unseen supporters. A feature of the game is that only one third of the pitch can be seen at any one time and three men from each side roam around this area.

The game revolves around the two "control" men of either side in different coloured strips from their team-mates; these are sent after the ball by the players and are usually the member of each side, who last touched the ball.

The player with the ball at his feet has every chance of dribbling past the entire team and reaching the opposing penalty area but is discouraged from doing so because the defender is just fast enough to catch him. Instead upfield passes hit "blind" into unseen areas of the pitch can be the telling tactic.

The players can foul, take throw-ins, corners and dribble with a realism which has yet to be matched by other T.V. games centres and it is the best Soccer cartridge so far available but whether it plays the sort of game which would bring the crowds back to English soccer, is open to doubt. Still at £18.95 it is cheaper than a season ticket at the Arsenal.

THE SLIPPERY OLYMPIC SLOPE

SKI-ING

Any skier who takes as much punishment as the one on the treacherous, fir-tree-covered slopes in this game, deserves an Olympic medal.

The game sportsman wraps himself around just about every tree on the course, he stumbles at the patches of untenable grey ice and crashes into the slalom poles, carefully spread out down its length.

But, every time, he pulls himself to his skis and sets off again.

And sure enough the courses gradually become easier, the turns tighter, the times faster.

The Olympic sport lends itself well to electronic graphics and with five downhill (trees only) and five slalom (gates to pass through) courses of varying difficulty, it keeps the interest up.

Speed and timing are the essence of the game. Speed is attained by facing downhill as the game mimics the sport by slowing down a skier who tackles the slope side on.

With the Atari difficulty switch down the grey patches of ice, which cover the slopes, become treacherous, but you can jump them at the push of the fire button.

The last of a recent batch of six cartridges from Activision for use with the Atari T.V. games centre, Ski-ing costs £16.75.

BIG TOP BRAVERY

JUMPING ACROBATS

The excitement of the circus comes to life in your front room with a couple of acrobats bouncing off a seasaw to burst high-flying balloons.

Each balloon an acrobat hits scores him a varying number of points.

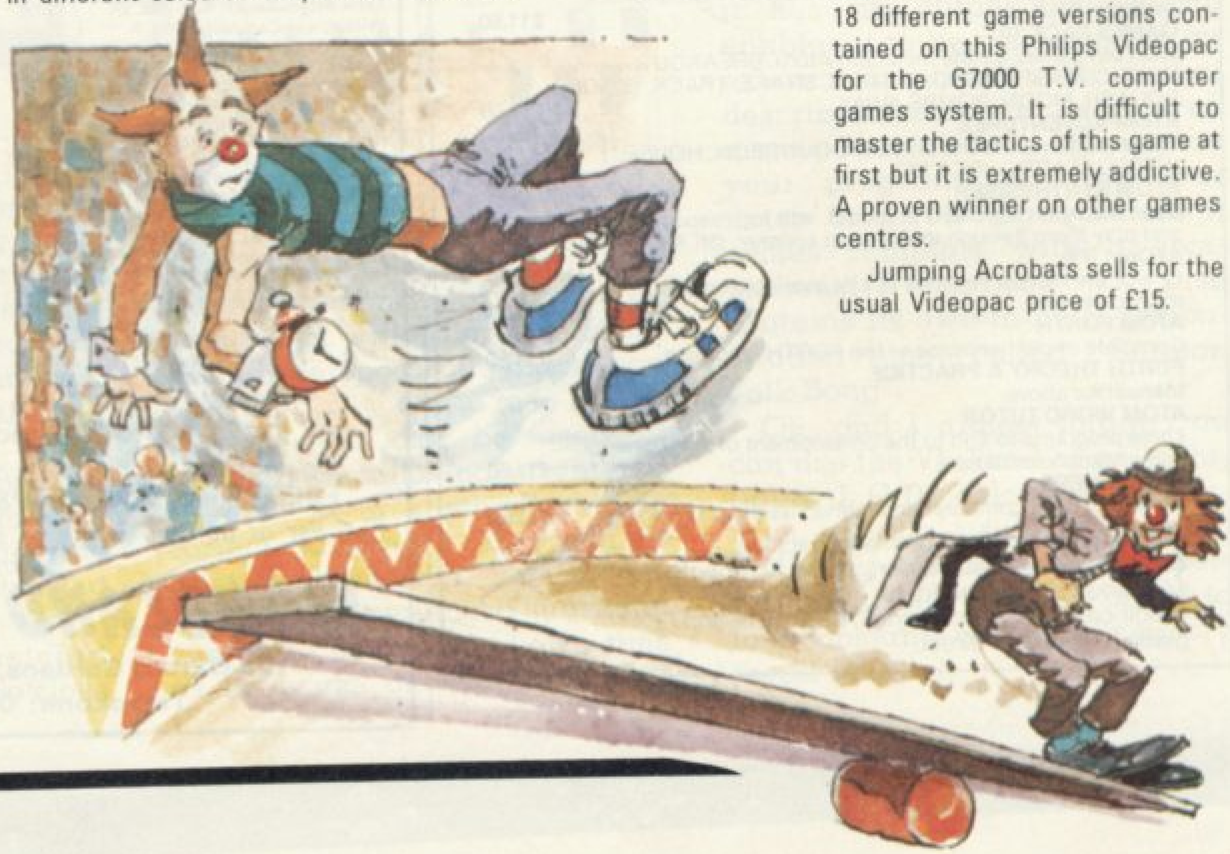
It's not as easy as it sounds. The skill of the game is in judging the positioning of the seesaw when your acrobat jumps off the platform — he jumps from either end of the screen. A miss and he crashes headfirst to the ground. Where your acrobat hits the seesaw, determines the height and angle of his next jump.

If you catch the plucky fellow right on the end of the see-saw his next leap will be prodigious and should burst plenty of balloons. Nearer the fulcrum, he will only manage a tiny jump. A high jump speeds things up and calls for really sharp reactions.

When you have gone through 10 brave acrobats, the game is over. In the harder versions, a shield appears just below the rows of balloons, which makes it more difficult to pop the balloons and gives you less time to judge where the flying acrobat will land.

Just to complicate the game even further, there is an option for moving balloons instead of static ones. Altogether there are 18 different game versions contained on this Philips Videopac for the G7000 T.V. computer games system. It is difficult to master the tactics of this game at first but it is extremely addictive. A proven winner on other games centres.

Jumping Acrobats sells for the usual Videopac price of £15.



Sounds

BY DAVID ANNAL

WHEN you are offered a "microchip orchestra" or an "instant musician" for £36 it is easy to shrug off the claims as pure advertising jargon.

In the first of a series of occasional reviews on sound equipment, books and software packages, I am investigating these claims, made by the manufacturers of the VL-Tone mini-synthesiser. What do you get for your money?

I had better admit that I have spent quite some time playing with and on Casio's VL-Tone and thoroughly enjoyed every minute.

The instrument is a monophonic synthesiser, playing one note at a time but incorporating in the package a simple rhythm generator which, if required, will accompany the tune with a suitable beat generated on "bongos" and "brushes". There are 10 different rhythms available, varying from a simple march to a complicated bossanova.

The whole instrument measures $11\frac{3}{4}$in × 3in × 1in and includes a speaker and internal batteries. An external power pack is available for running the unit from the mains. The batteries last for quite a long time, however, and an auto shut down is provided which conserves them by turning the instrument off if it is left for more than six minutes without being asked to do something.

The "keys" are, in reality, small black or white buttons, as appropriate, but they operate very easily and precisely and fast trills are possible.

An experienced musician might find that they are too close together but space is sacrificed for compactness, and compact it is!

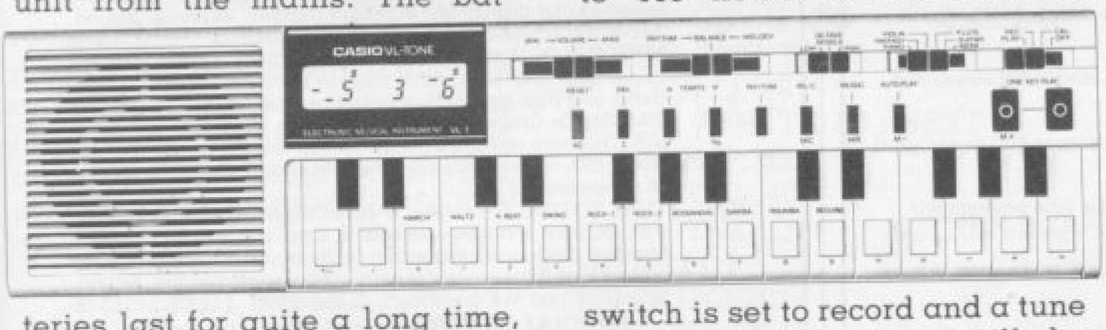
The keyboard covers a range of more than two octaves and an octave switch is provided which lowers or raises the pitch of the keyboard by an additional octave. A "voice" switch causes the sound produced to mimic one of five in-built instrumental types. These are: piano, violin, flute, guitar and fantasy.

The actual sounds made are far from the possibilities of a full-blown synthesiser but they are sufficiently life-like to deserve their titles — just!

The fantasy sound has a pleasant "ring" to it, together with vibrato and a long decay after the key has been released. Each note on the keyboard is numbered and, when played, this note number is shown on the L.C.D. display. Controls are provided to adjust the overall volume and also the balance between the percussion effect and the chosen voice.

So it is possible to play a tune on a small keyboard instrument which sounds almost like the real thing and which can be accompanied by an appropriate percussion rhythm.

Inside the VL-Tone there is a memory which can remember up to 100 notes. If the function switch is set to record and a tune is played, this tune will be stored in memory and can be recalled at will. The voice used, and the tempo of playback, can be varied.



Percussion can be used, if required and the notes entered need not be in "rhythm" or of the correct duration — they can be altered afterwards. This means that an inexperienced musician can enter notes in his own time as he works out what they are from a sheet of music or copies them from one of the easy entry tunes listed in the music book which accompanies the instrument.

Having entered the complete piece, the music which has been stored is then played back using the one-key play facility. Each time this key is pressed, the next note of the remembered tune is produced. It can now be played to sound right by ear and it will be re-remembered in its new form! The rhythm section can be used to keep you in time but will not be remembered as well. The whole tune can now be played through by one press on the "auto play" button.

Another excellent facility is provided on the VL-Tone, the ability to set up your own individual "voice". This remarkable instrument can be programmed to remember your own unique envelope pattern.

Millions of combinations are possible! The parameters which can be controlled are: wave type, attack time, decay time, sustain level, sustain time, release time, vibrato and tremulo.

The setting combination of those you like, should be noted down before erasing them. The instrument will remember the last programmed envelope and this will be stored at power off.

Will it do anything else? Well it will tune to a concert pitch for playing with other instruments, it has an output jack which enables it to be connected to an external amplifier, such as that described last month (or an even more powerful one), it can play your programmed tune four times in a row if requested, it comes complete with a comprehensive tune book and it also contains its own in-built demonstration tune, called "German Folk Song".

Oh, and I almost forgot, you can use the VL-Tone as an eight-figure L.C.D. calculator to perform all the usual arithmetic, including square roots and percentages with the use of up to four constants and a full memory recall facility!

Graphics



GO FOR YOUR MISSILE LAUNCHER

Shooting a space invader out of the sky is not the simple task it might seem.

Having shown how to draw the alien horrors and make them move,



in my first two columns, it is now time to finish them off and so complete the fundamentals of the space invader game.

While most of the arcade space invader games contain the same 6502 microprocessor as the Pet, Apple and other microcomputers, their programs are written in machine code, rather than Basic, for reasons of speed. However, the methods contained in the programs are the same whatever language they are written in, and by presenting programs in Basic the methods can be understood relatively easily.

The program fragments presented show in turn, how to fire and display a missile, how to detect whether the missile has hit a target and how to combine these to fire at a moving target. The methods and ideas behind the programs can be modified and adapted for much more sophisticated programs.

BY GARRY MARSHALL

SOME inventive use of graphics should provide you with a suitably stylish missile launcher at the bottom of your space invaders' screen but now you will need something to fire at the "meanies".

A missile can be launched by pressing any key if the GET statement is used. The movement of the missile across the screen is generated by using a simple loop.

The length of the delay determines the speed at which the missile moves. A Basic program, written for the Pet, to fire a missile up the screen in the way described is:

```
10 PRINT "[CLS]"
20 POKE 33747,81 : POKE 33707,93
30 Q = 33667
40 GET C$ : IF C$ = " " THEN 40
50 FOR I = 1 TO 23
60 POKE Q, 46
70 FOR J = 1 TO 20 : NEXT J
80 POKE Q, 32
90 Q = Q - 40
100 NEXT I
110 GOTO 30
```

The way to see if the missile has hit a target is to look ahead of the missile to see if anything is in the way.

On the video screen, it is reasonable to assume that if the next missile position contains anything other than a space then the missile has hit a target and an explosion should occur! The previous loop can be modified to give this:

PLOT MISSILE
↓
DELAY
↓
BLANK OUT MISSILE
↓
CALCULATE NEXT POSITION
↓
↑ **ANYTHING**
NO ← THERE?
↓
YES
↓
CREATE EXPLOSION

A program for this is:

```
10 POKE 33747, 81 : POKE 33707,
93
20 Q = 33667
40 GET C$ : IF C$ = "" THEN 40
50 FOR I = 1 TO 23
60 POKE Q, 46
70 FOR J = 1 TO 20 : NEXT J
80 POKE Q, 32
90 Q = Q - 40
100 IF PEEK (Q) < > 32 THEN 200
110 NEXT I
120 GOTO 20
200 POKE Q, 160
210 POKE Q - 40, 160 : POKE Q +
1, 160
220 POKE Q + 40, 160 : POKE Q -
1, 160
230 POKE Q - 40, 124 : POKE Q +
1, 108
240 POKE Q + 40, 123 : POKE Q -
1, 126
250 GOTO 210
```

This program gives the explosion effect generated by lines 200 to 250 if the missile hits any non-space character left on the screen when the program is run. There is plenty of scope for producing imaginative explosion effects.

A slight modification to the previous loop gives the basis of a program for shooting missiles at a moving target. The loop is:

PLOT MISSILE
↓
MOVE TARGET
↓
BLANK OUT MISSILE
↓
CALCULATE NEXT POSITION
↓
↑ **ANYTHING**
NO ← THERE?
↓
YES
↓
CREATE EXPLOSION

The previous program can be modified to realise this. An instruction to clear the screen should be added to the beginning. At line 30 a call to a subroutine to plot the target should be included, and line 70 replaced by a call to a subroutine that moves the target.

DOWN TO BASIC

BY MOIRA NORRIE

THE ART OF PRINTING PATTERNS

Last month, I left you this program:

```
10 FOR I = 1 TO 2
20 FOR J = 1 TO 4
30 PRINT "XXXX      XXXX"
40 NEXT J
50 FOR K = 1 TO 4
60 PRINT "     XXXX      XXXX"
70 NEXT K
80 NEXT I
90 END
```

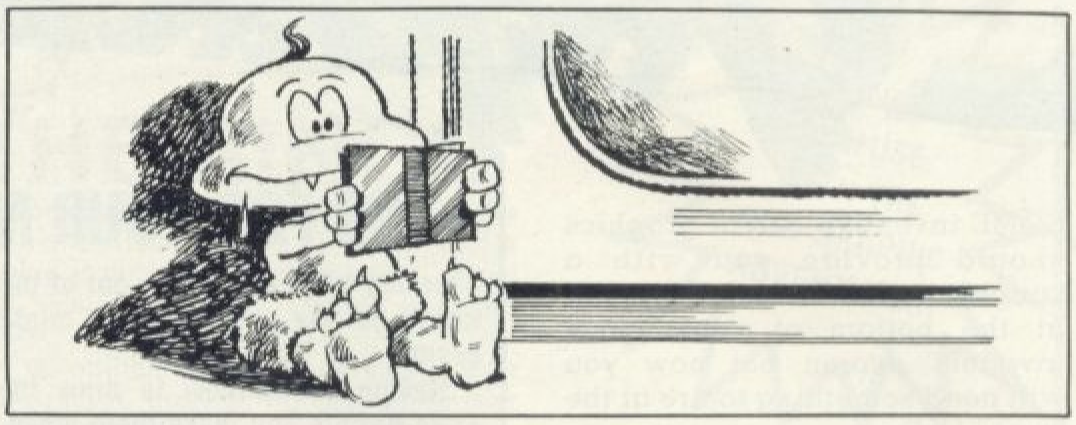
If you were able to RUN this program, you would have had the following pattern printed.

```
XXXX      XXXX
XXXX      XXXX
XXXX      XXXX
XXXX      XXXX
     XXXX      XXXX
     XXXX      XXXX
     XXXX      XXXX
     XXXX      XXXX
XXXX      XXXX
XXXX      XXXX
XXXX      XXXX
XXXX      XXXX
     XXXX      XXXX
     XXXX      XXXX
     XXXX      XXXX
     XXXX      XXXX
```

To make it easier for you to understand how the pattern is produced, I could describe the program as follows:

```
repeat 2 times
    repeat 4 times
        print first line of pattern
    end repeat
    repeat 4 times
        print second line of pattern
    end repeat
end repeat
```

You can see how all sorts of patterns could be developed by printing the appropriate strings of characters — blanks and non-blanks — within loops. By extending the above program, you could print a representation of a chessboard. With careful planning (and a good imagination), you can use this simple technique to "draw" anything from a spaceship to a personal portrait.

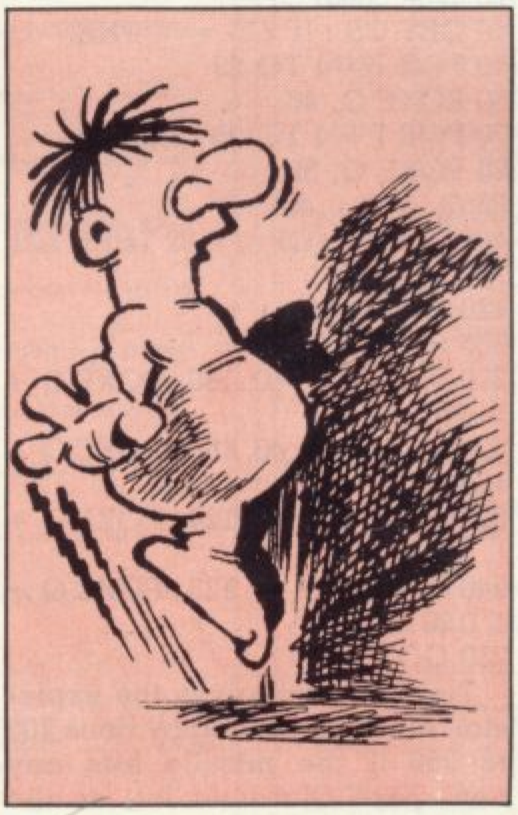


REMEMBER TO INCLUDE COMMENTS

There are two techniques that can be used to make programs easier to read and, therefore, easier to understand. These are:- the use of comments in your programs, and indenting chosen lines of your program.

To illustrate these techniques, I will rewrite a previous program.

```
10 REM PROGRAM TO SUM 5
       PAIRS OF NUMBERS
20 REM
30     FOR I = 1 TO 5
40         REM INPUT A
           PAIR OF NUMBERS
50         INPUT A,B
60         REM PRINT THE
           SUM OF THE PAIR
70         PRINT A+B
80     NEXT I
90 END
```



Comments can be inserted by the use of REM statements. "REM" indicates to the computer that the rest of the line is comment.

By including extra spaces, lines can be indented to improve the lay-out of a program. In particular, this can be used to clearly show the beginning and end of a loop.

Unfortunately, although it is good programming practice to use these techniques, they are often omitted in programs for microcomputers. The amount of space for storing programs is often very small and therefore comments are omitted to keep the size of a program to a minimum. However, unless the size of a program is critical, you should include comments as they are helpful to the programmer and others who will use the program.

THE KEY TO GOOD GRAPHICS

With an ordinary keyboard (similar to a typewriter keyboard), the quality of the pictures you can produce will be very limited. For this reason, many of the microcomputers have keyboards with special "graphic keys".

These keys produce characters such as:



The use of these special characters will allow the programmer to selectively "shade" areas of the screen. As a result, the quality and range of pictures

that can be printed will be much greater.

You now have sufficient knowledge of Basic to enable you to write programs to produce these pictures — it is simply a matter of experimenting with combinations of these graphic characters until you achieve the desired result!

Some microcomputer keyboards also have keys for the characters:

♠ ♥ ♦ ♣

This is obviously useful for writing programs to play card games.

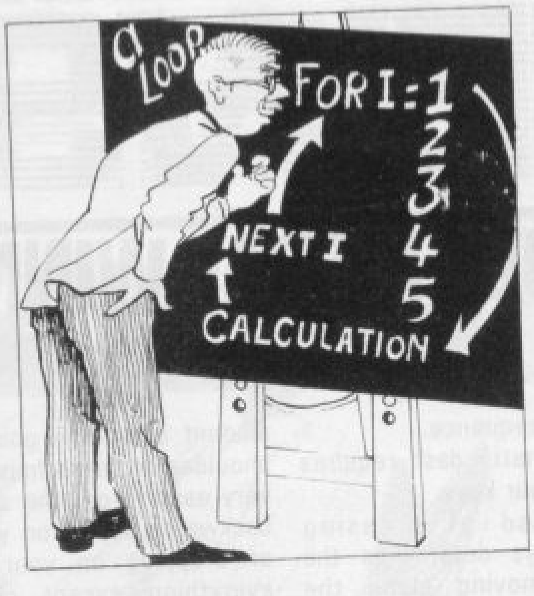
SOME MORE ABOUT LOOPS

I have looked at programs with loops created by a matching pair of statements of the form:

```
40 FOR I = 1 TO 5
  .....
  .....
80 NEXT I
```

The effect of this pair of statements is to cause the set of statements "bracketed" by them to be repeated five times.

The variable "I" acts as a count variable. Initially, "I" is given the value 1. Each time the instruction "NEXT I" is reached, the value of "I" is increased by 1 and the loop is repeated. This process continues until the new value of "I" would exceed the upper limit of 5. At this point, the computer stops looping and proceeds with the program.



In this way, "I" will take the values 1, 2, 3, 4, and 5, in that order, and it is therefore a count of the number of times round the loop.

My reason for explaining in detail the operation of the FOR and NEXT statements is that I now want to introduce loops of the form

```
40 For X = 2 TO 20 STEP 2
  .....
  .....
70 NEXT X
```

The format of the NEXT statement remains the same, but there are two important changes to the FOR statement.

Firstly, the initial value of the variable is a value other than 1 — in this case the initial value will be 2.

Secondly, a "step-size" of 2 has been specified. Each time the instruction "NEXT X" is reached, the value of "X" will be increased by 2. In general, if no "step-size" is specified in the FOR statement, then it is assumed to be a step-size of 1.

In the above example, "X" will take the values 2, 4, 6, 8, ... 20 and the loop will be repeated 10 times.

It is also possible to have a negative step-size. Clearly, this means that the initial value of the variable must be greater than the final value.

```
30 FOR Y = 5 TO 1 STEP -1
  .....
  .....
60 NEXT Y
```

In this case, "Y" will take the values 5, 4, 3, 2 and 1, in that order.

These types of FOR statement are useful when you are required to repeat a calculation for a pre-determined set of values. The FOR and NEXT statements can be used in this way to actually generate the required set of values.

For example assume you want to print a table of squares of all even numbers in the range 2-20. I have already given an example of a FOR statement that will generate the required set of even numbers. The complete program would be:

```
10 REM PROGRAM TO PRINT
       TABLE OF SQUARES
20 REM OF EVEN NUMBERS IN
       THE RANGE 2-20
30 REM
40     FOR X = 2 TO 20 STEP 2
50         PRINT X, X*X
60     NEXT X
70 END
```



NEXT ISSUE
GIVE US A CHANCE

Most games involve an element of chance. In order that you may write programs to play games, you must have some way of introducing the concept of chance, or luck, in your program. Next month, I will show you how this can be done using the Basic function "RND".

I will also introduce the "IF" statement. This statement can be used to select alternative sections of your program depending upon, for example the data typed in when the program is RUN.

NEXT ISSUE

A GOLD MEDAL WINNER

OLYMPIC DECATHLON

Decathlon has become a fashionable word since Daley Thompson brought back a gold medal from Moscow, and now the 10 events are available on one cassette.

Olympic Decathlon is one of the best games packages on the market and takes you through all 10 athletics events using superb graphics.

The events are 100 metre dash, long jump, shot put, high jump, 400 metre dash, 110 metre hurdles, discus, pole vault, javelin and 1500 metre run.

The aim is to get as many points in each event and to beat the present world record if possible. Up to six competitors may enter any one event — and there is a very necessary practice facility to allow the player to get familiar with the, sometimes, rather complicated keying and control sequence.

The 100 metre dash requires the use of four keys.

The speed of pressing alternate keys determines the speed of moving along the track. The long jump requires the use of the "X" and "Return" keys.

As the athlete moves along the track pressing the "X" by keys plants the foot for takeoff, and the time until the "Return" is pressed determines the angle of take-off — it is very difficult. The next event — the shot put — is even more difficult.

It needs games paddles — each dial determining the amount of energy going to the shoulder or tricep muscles. It is very easy to get the shot going backwards, falling on your head, or dropping on your toes — everything except going forward!

The high jump is similar to the long jump requiring use of the "X" and "Return" keys. The 400 metre dash follows the same rules as the 100 metre version. The 110 metre hurdles requires the push buttons on the paddles.

The discus throw is controlled by the "Space" bar and the "Return" key. The former starts the rotation of the athlete, the latter determines the point of release and away it sails.

Pole vault is by far the most skilful event, requiring co-ordination of five keys — two being pressed alternatively to determine the speed, another to determine the planting point, another to pull to the hand-stand, and the fifth to push the pole away. I have yet to see anyone successfully attempt it!

The javelin throw is similar, but only requires four keys. Finally the 1500 metres needs four keys to control the direction of run.

The highest score so far achieved by those testing this program was around 5,000. As 10,000 is possible you can see how far we have to go.

In conclusion, this is one of the best games programs available, and is highly recommended to all Apple users at a cost of £13.95.

DOZENS OF DEATHS TO LIVE THROUGH

GOBLINS

Death can come swiftly at the hands of the little creatures who have lent their name to the adventure game Goblins.

The game runs on a 48K Apple and is one of the growing stable of graphically illustrated adventure games from the U.S. firm of Highlands Computer Services. As with most adventure games the object is to wander around an imaginary stretch of countryside littered with valuable and magical items, horrendous monsters and rather nasty traps, with the intention of emerging from the trip both somewhat richer and still in one piece.

Goblins follows this now traditional mould. The player has to pit his wits against a variety of traps and monsters and accumulate a score, judged, in a fairly arbitrary way, by the computer.

The game makes use of the Apple's hi-resolution graphics capabilities by displaying to the player a scene representing that faced by the adventurer, and there is even an occasional piece of animation thrown in for good measure. Unfortunately one limitation of the graphics is that the scene displayed does not always correspond accurately to the choice of directions available.

Every so often during the course of the game, the player catches a glimpse of, what I at first took to be, a demented rabbit but what is, in fact, one of the goblins mentioned in the title of the game.

And on occasion (usually if your adventurer has been loitering about in the same location for more than a couple of moves) the goblin rushes towards you — with a good chance of killing your adventurer stone dead on the spot.

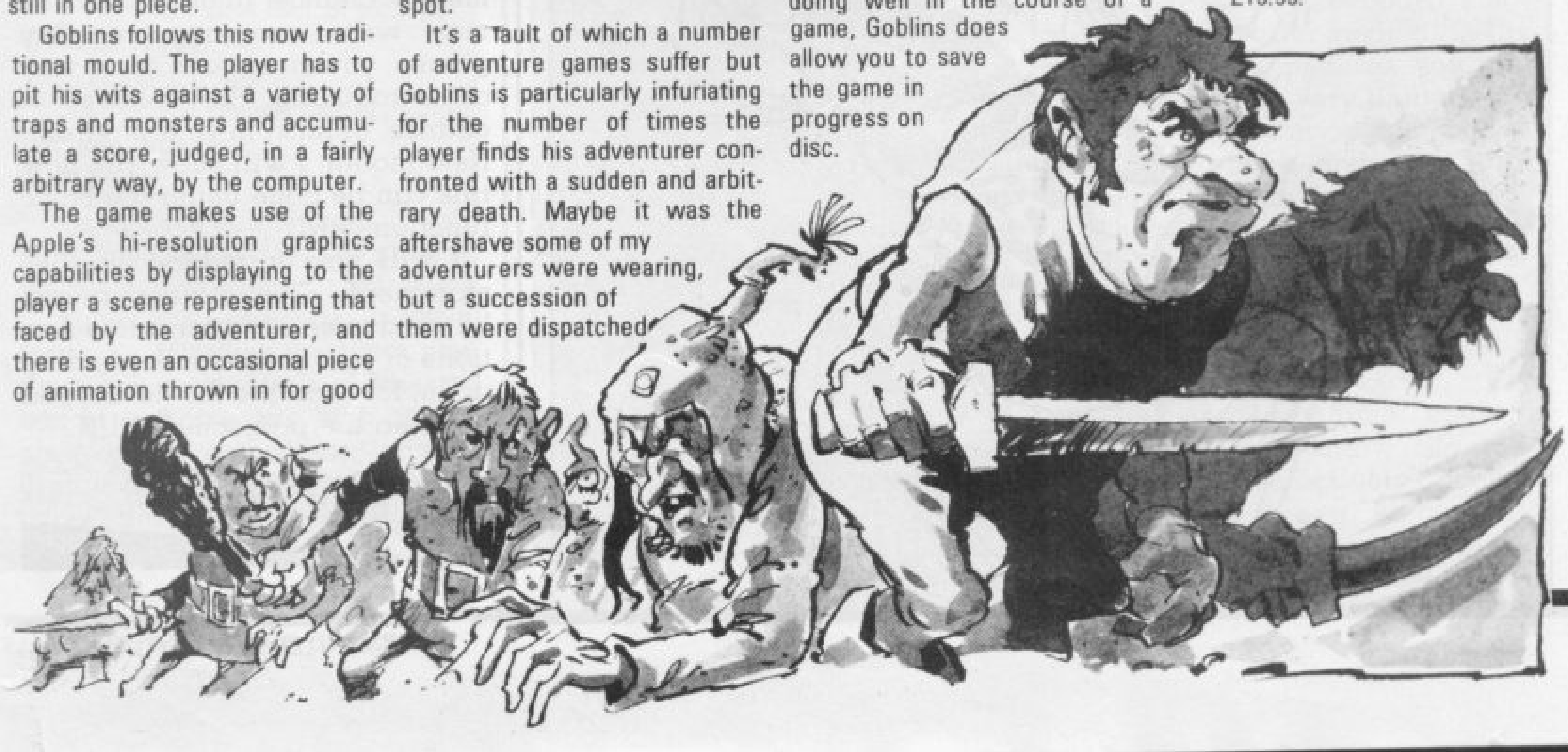
It's a fault of which a number of adventure games suffer but Goblins is particularly infuriating for the number of times the player finds his adventurer confronted with a sudden and arbitrary death. Maybe it was the aftershave some of my adventurers were wearing, but a succession of them were dispatched by vicious goblins without so much as a warning glimpse that one was in the vicinity.

The game also features several fatal traps which result either in instant (and unprovoked) death or a situation involving little prospect of escape. The fairest, and most imaginative, death I suffered was whilst sinking in quicksand: responding to the program's (unhelpful) advice to lighten my load I foolishly dropped some limes I had found earlier in the expedition, only to suffer fatally as they turned the quicksand to quick-setting cement!

Mind you, if you find you are doing well in the course of a game, Goblins does allow you to save the game in progress on disc.

Goblins is not without its fair share of bugs. The command "look down" generated the puzzling response: "The title is 'Igpa Atlina' ". I found later in the game a book where this same response more appropriately resulted from the command "read cover". I also found other problems with the Egyptian Scarab object.

Goblins will doubtless be very popular with keen adventure games players — although I found it a good deal less addictive than most adventures. The game comes with no instruction leaflet and only very brief instructions on disc. It costs £15.95.



EAT AND BE EATEN . . .



SUPER GLOOPER & METEORITES

Super Glooper and Meteorites are the latest arcade games to come out of the Supersoft stable and excellent games they are too!

Both are written in machine code (like all Supersoft arcade games) which means of course, that they are very fast and get faster with every level you survive.

Super Glooper was inspired by the popular Puckman game you'd spend 20p on in the amusement arcades.

The object is to move round a maze, "glooping" all of the little dots in the maze. After a certain number of dots have been "glooped", the glooper eaters, which have been penned up in the centre of the maze, will come after you.

The number at the top of the maze tells you how many eaters will be released. When you clear the maze of dots, more eaters will be released to hunt you.

Once the eaters have been released, there are two ways to escape: first you can leave the maze by one of two exits and reappear on the opposite side, luckily, the eaters cannot follow! You can also "gloop" one of the four larger dots at the corners of the maze, the eaters change colour and rush off; this is your chance to eat them and gain extra points but you'll have to be quick because they change back and chase you again. If you "gloop" an eater it returns to the pen ready to fight again! You have three gloopers per game. This game will certainly get the old heart rate going.

The object of Meteorites is to defend your seven moon bases against a savage meteorite attack.

Your only defence is a single laser cannon, directed of course by the numeric key pad. I found it very difficult at first but it shouldn't take you long to master the technique.

The meteorites will come at you in waves of six, as the level increases, they come thicker and faster, and of course the higher the level, the higher the points gained when you hit one!

However, if you should miss one and it smashes into the surface of the planet you lose points and a base — should it hit one. There's a nice visual effect in this game, when a meteorite does hit the surface the mountain range on the screen shakes.

After you've destroyed the first wave you will be awarded an extra base and the level of play goes up! Apparently something happens after the fifth level, but as I've never managed to reach the fourth level I can't tell you what it is, at the moment anyway!

Both Super Glooper and Meteorites have good sound effects. Two excellent games with excellent graphics to keep the whole family amused for hours (if your fingers can keep up the pace).

Both run on an 8K Pet and cost £8 plus V.A.T. each.

NO HIDING PLACE IN THIS INVASION

SUPER INVASION & DOUBLE BREAKOUT



American professionalism has brought home the shortcoming of many of our own software houses by producing two of the best Sinclair games cassettes around.

U.S. firm, Beam Software, offers Double Breakout and Super Invasion at £6 each — distributed over here by Essential Software.

Super Invasion is available in two forms — one for the original ZX80 and the other for the ZX81/ZX80 with 8K ROM. The documentation on all the Beam Software programs is very good, with the rear of the instruction sheet having a comprehensive description for foolproof loading of the cassettes.

Super Invasion is a very basic form of space invaders without the usual "barriers" that give protection from the invader's bombs. This makes it rather difficult to win, especially as you only have five lasers to fire, and you lose one each time you are hit. Once all the lasers have been destroyed, the game stops for a few seconds and then starts again.

There are three levels of skill, and even the lowest is relatively difficult! The graphics are very good, with no screen flicker (even on the old ZX80) and smooth control of the laser platform. A slightly more sophisticated version is available for 2K ZX80 old ROM on the reverse of the ZX80 version.

ZX80 Double Breakout is another machine code program which also has some very smooth graphics. There are seven levels of skill, with four being for the average player. You are given nine tries to break through two "walls". A bat is manoeuvrable in the vertical direction and the object of the game is to keep hitting the ball back at the wall so that bricks are dislodged progressively. Unfortunately, the ball bounces back at different angles. Sometimes you need to hit the ball with a moving bat to get the required spin.

All three games represent good value for money, and are highly recommended.

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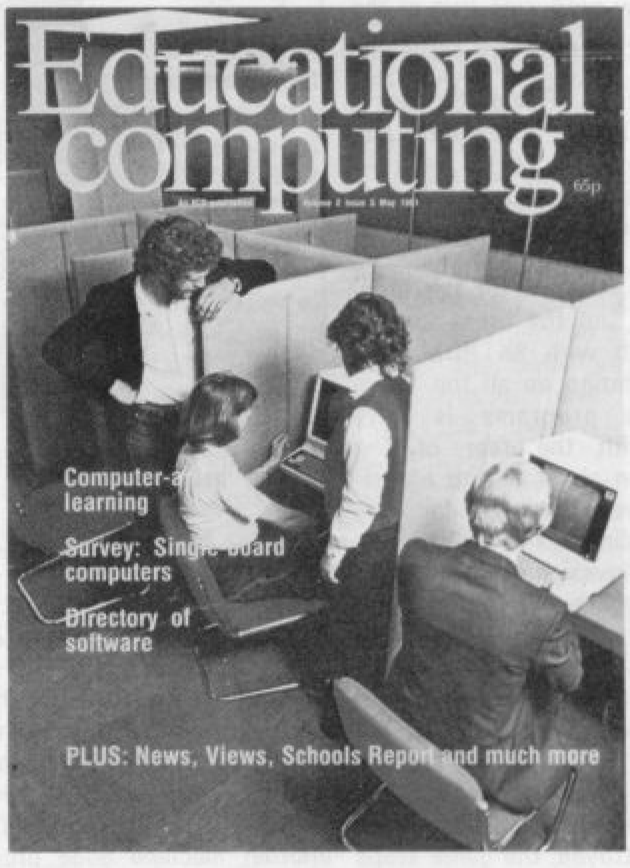
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MICRO GEN QUALITY PROGRAMS

ZX 81 CHESS

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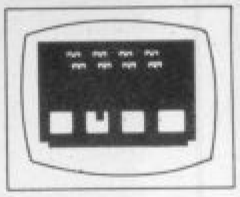
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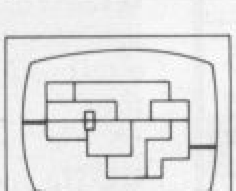
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SOFTWARE GLOSSARY

A beginner's guide to plain jargon

ARGUMENT The known reference factor necessary to find the desired item in a table.

ARRAY A series of items (data or information) arranged to form a meaningful pattern.

ARRAY INDICES Symbols or numbers used to identify a particular quantity in an array.

BITS BInary digiTS. The 0s and 1s that make up the binary code computers understand.

BUG A slang term given to a mistake in a computer program which prevents it working. It can refer to a mechanical, electrical or electronic defect in a computer.

BYTE A term to measure a number of bits (binary digits), usually eight bits to a byte.

CHIP A tiny piece of silicon which holds all the components that make up a microprocessor.

CHARACTER STRING A sequence of characters in a row.

FOR . . . NEXT A Basic statement which is an instruction used for repetition of a sequence of program statements (see loop).

FUNCTION A special purpose or characteristic action of a program.

GOSUB A Basic command instructing the computer to go to a subroutine in a computer program.

GOTO A Basic command which tells the computer to jump to another line in a computer program.

GRAPHICS CHARACTERS The name given to pictorial representation of data such as plotted graphs, engineering drawings and computer games.

HARDCOPY A printed copy of machine output in a visually readable form.

HARDWARE A general term given to all pieces of electronic and mechanical devices which make up a computer system, i.e. the actual machines.

INPUT Information which is fed into the computer.

INTEGER A number which does not contain a decimal point, i.e. a whole number.

K Abbreviation for Kilobyte.

KILOBYTE A measurement of memory capacity. 1024 bytes of memory. So 8K is equivalent to 8192 bytes.

L.E.D. (Light Emitting Diode) Provides a simple display and consists of an electron tube which lights up when electricity is passed through it. Used as an alternative to liquid crystal displays in calculators and watches.

LET A Basic statement which defines a variable. E.g. LET A=0.

LOOP A Basic function referring to the repeated execution of a series of instructions for a fixed number of times.

MACHINE CODE The term used to refer to symbols or numbers assigned to parts of a machine. It is the same as operation code which is the symbol telling the computer what operation to perform. When a game is written in machine code it makes everything happen more swiftly.

MEMORY A measurement of how much information a computer can cope with.

MICROPROCESSOR another name for a chip.

SOFTWARE GLOSSARY

A beginner's guide to plain jargon

NEXT (See FOR . . . NEXT).

PEEK A statement used in Basic which allows you to read the contents of a specified memory address.

POKE An instruction used in most versions of Basic allowing you to store integers in a specific place in memory.

PRINT A Basic command which tells the computer to perform a calculation in a program.

PRINTOUT The data output from the computer which appears in printed form.

PROCESSING Handling and manipulating computer data.

PROGRAM (Computer) A series of instructions fed into a computer which will solve a problem or accomplish an objective.

REM A basic statement which provides an explanation of key sections in a program.

ROM (Read Only Memory) A memory chip which can only be read from and not written into.

ROUTINE A set of coded computer instructions used for a particular function in a program.

SOFTWARE The programs fed into a computer, which make them perform what we want them to do.

STRING A connected sequence of characters, words or other elements usually symbolised with the $ (dollar) sign.

SUBROUTINE A computer program routine that is translated separately, generally used in several computer programs or several times in one program.



PROGRAM LOGIC Making sure a program is designed and input in the correct sequence.

RAM (Random Access Memory) This is a memory chip which you can load programs and data to and from. There are different sized RAMs capable of storing various amounts of information.

TABLE A collection of information suitably written for easy reference.

VALUE The numerical quantity of a data element, and is the number assigned to a variable.

VARIABLE A symbol whose numeric value can be changed at all times. It is used when writing programs.

HARD

A GUIDE TO THE LOW-COST COMPUTERS

ACORN ATOM Cambridge based Acorn Computers manufactures the Atom machine which has a memory capacity of 2K, but it can be upgraded to 12K.

It must be plugged into a television and is available in either kit form or ready built. As a kit it costs £120 for the 2K computer or £150 for the finished product. For a more powerful system, 12K, the price stands at £220 (in kit) and £250 completed.

Acorn also makes the Systems 1, 2, and 3 which cost between £69 and £750.

APPLE The Apple has a solid software base for both business and entertainment applications. The machine comes with a memory capacity, ranging from 8-48K. You can buy joysticks and paddles to plug in for use with computer games. Colour graphics can be used with a colour television.

The 48K machine costs £695 and is obtainable from Apple U.K., formerly Microsense which is based in Hemel Hempstead, Hertfordshire.

ATARI 400/800 Most of the software for the Atari microcomputers are games or educational, with business applications only recently being introduced.

The basic 400 with 16K RAM costs £340 direct from Atari's UK distributors, via London-based Ingersoll Electronics. The 32K version sells for £395. Peripherals for the machines, like disc drive units and cassette recorders can also be obtained from Ingersoll for £325 and £45 respectively. The 800 is expandable to 48K and the 16K machine sells for £645.

BBC COMPUTER The computer adopted by the BBC to sell in conjunction with its forthcoming series is based on the Acorn Proton. The BBC has developed its own Basic to be used on the machine. Minimum memory is 16K RAM, maximum being 32K. Present plans for the machine are dual purpose, both business and games. Optional extras include joysticks, paddles, disc drives and a cassette for tape loading.

Price is put at £235 for the 16K computer and £335 for the 32K version.

DAI This is a personal computer made by Data Applications for both business use and home entertainment. The U.K. system (it is made in Belgium) has 48K RAM as well as full colour and sound commands. Data Applications is based in Cirencester, Gloucestershire. The 48K system now costs £595.

NASCOM There are two Nascoms available at the moment, both can be used for business and games. The Nascom 2 is the more powerful of the two with 8K RAM and with a Basic interpreter.

It can be bought in kit form and off the shelf complete. The kit is £125 for 1K RAM and £140 for the finished 1K product. £225 will secure an 8K kit. Nascoms are available from Warwick-based Lucas Logic.

NEWBRAIN This is a hand-held computer unit which is at the low end of the price bracket. For 2K RAM you pay £159 upwards and it is expandable to 20K of memory. Hobbyists often opt for this machine because of its low cost and it is used for general business and for playing games. An expansion unit is available which supports floppy disc drives, a printer and a visual display unit. It is available from the Grundy Group.

OHIO SCIENTIFIC Ohio Scientific (OSI) make the Superboard which is aimed at the hobbyist market. Its memory capacity starts at 4K RAM and is expandable to 32K if you buy the add-on board.

Other machines in this family include the Challenger 1 and 4. These are essentially, cased versions of Superboard. The Challenger 4 is the cheapest of these at £575 and includes colour and sound options.

PET Made by Commodore Business Machines, the Pet ranges from 8K RAM to 32K RAM. It is used mostly by small businesses for general applications but has a hefty hobbyist following. It is available from Commodore of Slough at a starting price of £460. Compatible peripherals are available for the Pet, including disc drives, cassettes for loading tapes and printers.

SHARP MZ-80K Popular with both business and home users, the Sharp's memory capacity starts at 16K and has a top limit of 48K. It comes with a monitor and a cassette recorder built onto the keyboard unit. Disk drives are also available. Manchester-based Sharp Electronics have a recommended retail price of £460 for the 48K unit.

SHARP PC-1211 The smallest computer in the Sharp range. Sharp classifies it as a pocket computer and it is programmable in Basic. It also has a cassette interface for loading and costs upwards of £85.

SINCLAIR There are two types of Sinclair's microcomputer available for under £100. Sinclair really brought the microcomputer into the home. The machines are ideal for learning the rudiments of computing but are limiting graphically. The ZX80 has 1K of memory and is expandable up to 8K, but is no longer in production. The ZX81 sells for £49.95 for 1K in kit form or £69.95 ready assembled. The 16K RAM packs cost £49.95.

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SORCERER The Exidy Sorcerer is a home computer with a sizeable games following but it is one of the more expensive of the microcomputers, costing upwards of £749. Memory amount ranges from 48K to 55K and there is a plug-in ROM pack for extra capacity. Disc drives and visual display unit are an additional cost. Sorcerer's can be obtained from a Cornish firm, Liveport of St Ives.

TANDY TRS-80 Tandy's TRS-80 Model 1 is a machine which is often used for games and is well-supplied with software for both entertainment and business applications. Its memory capacity goes from 4K to 16K but there is an expansion unit available upgrading it to 48K if you want the extra memory. The Model 1 is the cheapest of the Tandy range.

The Model 1 costs £459 but comes complete with a monitor to use as a V.D.U. and a cassette. The Model III is an integral unit made up of a keyboard, 12" screen and two slots for 5¼" discs. It costs from £499.

48K of RAM. The Microtan 65 costs £79.35 for the 1K kit, or £90.85 assembled. Tangerine is based in Ely, Cambridgeshire.

TI-99/4 This computer has recently been re-launched by Texas Instruments. It consists of a separate keyboard with graphics facilities in full colour and now plugs in to a U.K. television. Software available for it from Texas Instruments is mostly business and educational but the firm has recently introduced a bundle of games to run on the computer. It has 16K RAM and uses tapes, discs or plug-in games cartridges. You can buy one of these from Bedford-based T.I. for £299.

VIC-20 The VIC is the much-publicised baby of the range of microcomputers from Commodore of Slough. At £185 it is one of the cheapest. Deliveries to dealers have just started. The VIC has full colour graphics on a colour T.V. and there are joysticks available. Although Commodore are plugging the business use of the machine it is tipped to be a hot games computer because of its colour graphics and low cost.



TANDY TRS-80 COLOUR COMPUTER Tandy's latest addition to its range of computers is the Extended Basic Micro Colour Computer, (or TRS-80 Colour Computer for Short). It is available with either 16 or 32K of memory and costs £449.

The actual computer unit consists of a keyboard which can be plugged into any television set. It is aimed at both business and games users and Tandy has bought out a variety of instant loading games program packages for the machine.

Joysticks to play some of the games are extra and cost £17.95 a pair. The colour computer can be obtained from Tandy stores nationwide.

TANGERINE Tangerine Computer Systems produce the Microtan 65, a microcomputer for games and personal use like household accounts. It comes in kit form and is expandable from an initial 1K memory up to

VIDEO GENIE The Genie is made by E.A.C.A. and is a popular games machine. It is compatible with the Tandy TRS-80 Model 1. With 16K to 48K RAM there are disc drives available. The basic unit costs from £369 and is available from Lowe Electronics of Matlock in Derbyshire.

U.K.101 This machine comes in either kit form or ready built with memory capacity of 4K to 40K (with an expansion board). It contains television and cassette interfaces so you don't need a V.D.U. The U.K.101 is a popular computer for playing games and there is a lot of software around for it. The kit costs £149 for 4K, ready built it sells for £199.

AD INDEX

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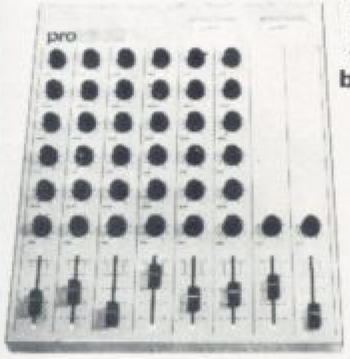
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